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Preface

DFdiscover Release 5.10.0

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Getting Help

For software support, Please contact the DFdiscover team:

- via email, help@dfnetresearch.com.
- Visit our website, <https://www.dfnetresearch.com>.

Conventions

A number of conventions have been used throughout this document.

Any freestanding sections of code are generally shown like this:

```
# this is example code  
code = code + overhead;
```

If a line starts with # or %, this character denotes the system prompt and is not typed by the user.

Text may also have several styles:

- Emphasized words are shown as follows: **emphasized** words.
- Filenames appear in the text like so: dummy.c.
- Code, constants, and literals in the text appear like so: main.c.

- Variable names appear in the text like so: nBytes.
- Text on user interface labels or menus is shown as: **Printer name**, while buttons in user interfaces are shown as `Button`.
- Menus and menu items are shown as: `File` > `Exit`.

Introduction

Chapters [DFdiscover Software Installation](#), [DFdiscover Acceptance Test Kit \(ATK\) Installation](#) and [Installation Completion](#) are required for new and upgrade installations. Chapters [DFdiscover Configuration](#), and [Integration Testing](#) are required for new installations only. Implementation of [Client Desktop Packages Installation](#) will be dependent upon the packages that are included with the release. Chapter [Study Installation](#) is required only when a new study setup is available at the time of **DFdiscover** installation.

IMPORTANT: Execute chapters and steps in order All chapters and steps must be executed in document order.

Software Release

DFdiscover 2025 Version 5.10.0 is a continuation of the DFdiscover 2018 major release, having a major version number of 5, minor version number of 8 (the eighth minor version) and patch version number of 0 (this is not a patch). It contains everything needed for a complete installation.

Installation Worksheet

The last chapter, [DFdiscover Installation Worksheet](#), is an installation worksheet that should be completed at the same time as the installation is being performed. Use of the worksheet will confirm that no steps are missed and can subsequently be used as a part of documentation for installation qualification. If a step is not relevant or not required, mark that location of the worksheet NA (or stroke through it), rather than leaving it blank.

Procedures in the body of the guide that must be recorded on the worksheet are marked with **[CC##]**, a cross-reference symbol (XREF), where CC is an acronym for the chapter name and ## is a sequence number for the step within the chapter.

DFdiscover Software Installation

This chapter ensures that the individuals responsible for **DFdiscover** have been identified, the materials necessary for the install are available, configures the UNIX environment of the server, and then steps through the installation of the major version.

Staffing

A successful **DFdiscover** installation and subsequent properly maintained **DFdiscover** environment requires the commitment of personnel with different skills. It is essential that these personnel be identified in advance and be trained in the relevant aspects of **DFdiscover**. The following is a minimal set of job functions for which personnel must be identified. On the worksheet, record the names of one or more staff that will fill each job function. It is entirely acceptable for a single individual to perform more than one of the job functions.

- **[UNIX administrator] [[SI50]]** This job function includes maintenance of the hardware and operating system, supervision of and planning for resources such as disk storage and printers, administration of **HylaFAX** and modems, supervision of cron jobs, installation of application software and any updates, backup and recovery of data, and the creation of UNIX user accounts. The primary contact is the **DFdiscover** administrator. Typically this job requires 0.1 FTE.
- **[DFdiscover administrator] [[SI51]]** This job function includes registration of new studies to **DFdiscover**, administration of user privileges within **DFdiscover**, starting and stopping of study databases, and monitoring of study database consistency. Typically this job requires 0.1 FTE.
- **[Study setup] [[SI52]]** This job function is responsible for the definition of the study database to **DFdiscover** which minimally includes importing of the CRFs for setup, definition of variable styles and variables, specification of visit scheduling, and entry of participating centers information. This job function may also be involved in the initial creation of CRFs.
- **[Programmer] [[SI53]]** The programmer is responsible for creating any custom logic checks (referred to as edit checks within **DFdiscover**) and possibly executing them in batch, creating any study-specific reports, and defining lookup or coding tables.
- **[SAS specialist] [[SI54]]** This job function is responsible for creating **DFsas** specification files, executing them in **DFdiscover**, and subsequently processing the results in **SAS®**. This job function may also get involved in the definition of variable names, data types, and coding, and hence may liaise with the study setup job function.
- **[Data entry] [[SI55]]** This job function performs initial (and possibly second, or double data entry) review of received CRFs, verifying the data that was read by ICR, entering data that was not read, adding Queries where necessary, and identifying and resolving duplicates when they occur.
- **[Higher-level data review] [[SI56]]** This job function performs additional data reviews after entry. The focus is on data quality, completeness, and consistency.

Before Installation

Before beginning installation, the following steps must be completed as they gather information necessary for the install.

- Record the **[full company name]** on the worksheet [\[\[SI00\]\]](#).
- Record the **[DFdiscover software release]** on the worksheet [\[\[SI01\]\]](#).

Release numbers are of the form X.Y.Z.

NOTE: These installation instructions are for a specific **DFdiscover** software release only. Confirm that the software release number on the download matches the software release number at the head of this document.

- Record today's date on the worksheet [\[\[SI02\]\]](#).
- Determine the name of the contact person [\[\[SI03\]\]](#), the server hostname [\[\[SI04\]\]](#), and the version of operating system on the server [\[\[SI05\]\]](#). The contact person, in accordance with the **DFdiscover License Agreement**, should be the **DFdiscover** administrator or the **DFdiscover** software user consultant, and will be the primary liaison between end users and DF/Net Research, Inc..
- Confirm the name of a printer that can be accessed from the **DFdiscover** environment [\[\[SI08\]\]](#).
- Confirm that www.dfnetresearch.com can be accessed for obtaining the software release, patches and other

downloads [\[\[SI09\]\]](#).

- Confirm that the computer that will be running the **DFdiscover** software is able to send email externally, for example to DF/Net Research, Inc. help@dfnetresearch.com [\[\[SI57\]\]](#).

Installation Materials

The following materials are required for installation:

- these **installation notes** [\[\[SI13\]\]](#)
- the **super-user password** for the server machine [\[\[SI14\]\]](#)
- the current **DFdiscover software release** [\[\[SI15\]\]](#)
- a copy of the **DFdiscover Release Notes** [\[\[SI16\]\]](#)
- a copy of the Installation and Initialization chapter of the **DFdiscover Acceptance Test Kit documentation** [\[\[SI18\]\]](#)
- a **DFdiscover License Renewal form** (or email) [\[\[SI21\]\]](#) with a valid license and expiration date for the server host identifier.

Transcribe the values from the form/email to the worksheet: [**hostid** [\[\[SI37\]\]](#) , **hostname** [\[\[SI38\]\]](#) , **# of users** [\[\[SI39\]\]](#) , **expiry date** [\[\[SI40\]\]](#) , **features** [\[\[SI42\]\]](#) , **password** [\[\[SI41\]\]](#)]

- a **support username** [\[\[SI22\]\]](#) and **support password** [\[\[SI23\]\]](#) that will grant access to the support section of www.dfnetresearch.com

If the first study setup is being supplied by DF/Net Research, Inc., the **study setup** [\[\[SI24\]\]](#) is also required.

Installation

The steps in this section require the **DFdiscover** software media from download and super-user privileges.

Linux Installation Instructions

DFdiscover 2025 is supported on Novell openSUSE version Leap 42.1 and newer, SUSE Tumbleweed and Redhat Enterprise Linux (CentOS) versions 8.X and 9.X. **DFdiscover** is a 64-bit server application - it installs on the 64-bit versions of any of these Linux distributions. It will not run on 32-bit systems. Other Linux distributions may work, but are unsupported. Debian distributions such as Ubuntu will not work at this time.

Before you install DFdiscover

1. If this is a new installation, *DO NOT CREATE* a datafax user account or /opt/dfdiscover directory. These tasks are completed automatically by the installer. The installer also adds the **DFdiscover** executables to the system-wide path and installs **DFdiscover** as a **systemd** service.
2. If this is an upgrade of a DataFax server, there are several important changes that will be performed on your system. It is **HIGHLY** recommended that you have a complete backup or snapshot of your server prior to upgrading. Ensure that the datafax account is not in use as the installer moves /opt/datafax to /opt/dfdiscover and resets the datafax account home directory to the new file structure. The system wide path to the software is automatically adjusted. Existing configuration files are automatically adjusted to match the new file structure.
3. If this is an upgrade of a **DFdiscover** server, no special changes are required.

Installing DFdiscover

1. Download and save the software rpm, from www.dfnetresearch.com to a local hard drive. Login to your server as root.
2. If this is an upgrade, stop **DataFax/DFdiscover**, and erase the current version.

- Stop **DataFax/DFdiscover** as follows:

```
# DFshutdown -f
```

or

```
# systemctl stop dfdiscover
```

- On openSUSE, use **zypper** to remove **DataFax/DFdiscover** as follows:

```
# zypper remove datafax
```

or

```
# zypper remove dfdiscover
```

- On RHEL, **dnf** to remove **DataFax/DFDiscover** as follows:

```
# dnf remove datafax
```

or

```
# dnf remove dfdiscover
```

3. A complete installation will require approximately 1.7 Gb of free disk space for the software and documentation. The software will be installed into /opt/dfdiscover. Record the **[installation directory]** [\[\[S132\]\]](#).

Execute the installation command appropriate for the operating system.

- On openSUSE, use **zypper**, which will automatically download and install any dependencies required:

```
# zypper --no-gpg-checks install dfdiscover-5.10-0.x86_64.rpm
```

- On RHEL, use **dnf**, which will automatically download and install any dependencies required:

```
# dnf --nogpgcheck install dfdiscover-5.10-0.x86_64.rpm
```

NOTE: RHEL 9.X ships with OpenSSL 3.0 system libraries by default, during **DFdiscover** installation OpenSSL 1.1 (compat-openssl11) libraries will be installed.

1. Record that the **Linux installation completed successfully** on the worksheet [\[\[LX00\]\]](#).

Request and Install Server Certificate

NOTE: If you already have a valid certificate, you can skip this step. If you acquired a certificate from a commercial CA, you can skip this step.

The steps in this section require super-user privileges.

DFexplore and other **DFdiscover** client applications communicate with the **DFdiscover** server using TLS (Transport Layer Security, specifically TLS v1.2 and TLS v1.3), in the same way that Internet banking sites do. TLS provides an encrypted path through the internet that prevents eavesdropping and modification of your data by third parties. Each **DFdiscover** client checks that it is communicating with the correct **DFdiscover** server by means of a certificate which encodes the **DFdiscover** server's name and ownership. This certificate is generated by choosing a very large random number (a key), adding organizational ownership information to it and then requesting that DF/Net Research, Inc. certify this key as authentic. When an **DFexplore** client connects to the **DFdiscover** server, it asks for this certificate and can then determine whether it is communicating with the correct server.

The process of generating a certificate starts with the execution of **DFserveradmin** which generates the random number and then prompts for required organizational information, including the country, state, organization name and server name. Once this information has been provided, an email is generated to certreq@dfnetresearch.com containing a request to certify that this is an authentic **DFdiscover** server. DF/Net Research, Inc. processes this request and emails back a small file containing the certificate, which is then installed into the **DFdiscover** system. Once this step has been completed, **DFdiscover** and **DFexplore** can be used.

Request Server Certificate

1. **Login as super-user.**
2. **[Use DFserveradmin to create the certificate request] [[C101]]**

The certificate request is created with the **DFserveradmin** program. Click **Request an SSL certificate signing for DFedcservice** and enter the appropriate values for each of the fields.

Typical certificate request dialog

The screenshot shows a window titled "DFserveradmin - DFdiscover Server Administration". The main content area is titled "dfserveradmin" and has a green power button icon and a help icon. Below the title bar are tabs: "Master", "SSL Certificate", "License", "Study Spaces", and "Study Diagnostics". The "SSL Certificate" tab is selected, and the sub-header is "Request an SSL certificate signing for DFedcservice". The form contains the following fields and values:

Country (2 letter code)	US
State or Province (Full name)	New York
Locality Name (City)	New York
Organization Name (Company)	Clinical Research Solutions International
Organizational Unit (Section)	Data Management
DFdiscover Server Domain Name	datafax.crsi.com
Email	datafax@crsi.com

At the bottom of the form is a "Send Request" button.

Once you have entered the required data, click **Send Request** to submit the certificate signing request to DF/Net Research, Inc..

NOTE: The certificate signing request is emailed to DF/Net Research, Inc. from the machine where the **DFserveradmin** program was executed. This machine must be able to send email to the internet (in other words, outside of any corporate intranet). If that is not possible, the files /tmp/cert.csr.txt and /tmp/cert.csr can be transferred (use binary mode if doing this via ftp) to another machine and sent as attachments in an email to certreq@dfnetresearch.com.

3. Wait for the certificate

This is the end of the procedure for generating a certificate request. You can expect an email with a signed certificate within 24 hours on business days.

In the interim, it is still possible to proceed as **DFserveradmin** also generates a self-signed certificate that is valid for 10 days.

Install Server Certificate

1. Determine install location

The server certificate must be installed in the location referenced by the certificate keyword in the /opt/dfdiscover/lib/DFedcservice.cf file. For example, this DFedcservice.cf file:

```
master localhost
key /opt/discover/lib/edckey.pem
certificate /opt/discover/lib/edccert.pem
documentroot /opt/discover/edcdocs
```

identifies /opt/discover/lib/edccert.pem as the location of the server certificate.

2. [Save the signed certificate] [\[\[CI02\]\]](#)

The signed certificate will be emailed back to the email address that was specified as the Email Address in the certificate request procedure. Typically it will appear as a small (~1KB) attachment named edccert.pem.

Save the attachment to the filename identified in the first step. If **DFcertReq** also generated a self-signed certificate, that certificate will be overwritten by this permanent, signed certificate.

This is the end of the steps necessary to request and install a server certificate.

Request and Install DFdiscover License

The process of requesting and installing a **DFdiscover** license is described in this section.

DFdiscover is licensed on an annual basis for a specified maximum number of concurrent users working on a uniquely identified **DFdiscover** server. Each license is unique to the combination of server identifier, features, expiry date, and number of licensed users. If any of these values changes, the existing license becomes invalid and a new license is required. Please note that if you are upgrading an existing DataFax server you will need to request a replacement license as the old license will no longer work once **DFdiscover** is installed.

NOTE: **DFdiscover** employs a concurrent user license mechanism based on a unique host identifier, which requires one machine on the network to act as the central **DFdiscover** server. Choose a machine that is reliable (infrequently down) and is accessible by all potential **DFdiscover** client machines. If another server replaces the selected server in the future, a new license must be requested from DF/Net Research, Inc..

Request DFdiscover License

1. Determine server identifier

The unique [server identifier] [\[LI01\]](#) can be determined with the **DFhostid** command, as in:

```
# /opt/dfdiscover/bin/DFhostid
SG8D-QM2L-V8TK-PFB5-DDEG
```

The output is a 20 character/digit identifier displayed in 5 blocks of 4. Note that the identifier will never contain any of 0 (zero), 1 (one), I (capital i), or O (capital o).

2. Forward server identifier to DF/Net Research, Inc.

Contact DF/Net Research, Inc. via telephone or email and provide them with this unique server identifier. Using the server identifier, and other license information including the expiry date, the number of licenses purchased, and any additional licensed features (such as web services or large study numbers), DF/Net Research, Inc. will generate a unique license. The license information will be emailed to the **DFdiscover** administrator.

3. Install DFdiscover License

The license will arrive in the body of an email message and have the following appearance:

```
hostid      SG8D-QM2L-V8TK-PFB5-DDEG
hostname    <replace_with_your_hostname>
nclients    12
expiration  20191231
password    2SQG-PGVG-BVXY-87BU-YYBL
features    DFWS,LS
```

[Save the license] [\[LI03\]](#) to the file /opt/dfdiscover/work/license (note the license will always be stored in this location, it is not customizable).

4. Update hostname in DFdiscover License [\[LI04\]](#)

In the installed license, the value for the hostname keyword must be updated. Edit the saved license and replace *<replace_with_your_hostname>* with the actual hostname of the server (this can be the fully qualified name or the nickname). Be careful to use the correct name and spell it correctly - if the hostname is inaccurate, **DFdiscover** will not start. Save the changes to the license file.

Migrate pre-2014 studies

This step is applicable **only** if you have studies that were created in pre-2014 versions of DataFax. It must be performed by super-user.

DFdiscover requires that studies from pre-2014.0.0 DataFax installations be migrated using the **DFmigrate** program to take advantage of new features. **DFmigrate** will determine which steps need to be taken based on the version of **DFdiscover** that the study is from. These changes may include moving edit checks to an ecsrc directory and moving the lookup tables into a lut directory.

Upgrading all Studies

- To upgrade all studies on your system, as super-user run:

```
# /opt/dfdiscover/utis/DFmigrate -a
```

The following shows example output from this command:

```
*****
```

DFmigrate: Study 254 - /opt/studies/val254 - Thu Apr 18 15:04:33 2019

Step 1: Updating DFserver.cf

File Converted: /opt/studies/val254/lib/DFserver.cf

Step 2: Converting DFsetup

File Converted: /opt/studies/val254/lib/DFsetup

File Converted: /opt/studies/val254/lib/DFschema

File Converted: /opt/studies/val254/lib/DFschema.stl

File Converted: /opt/studies/val254/lib/DFtips

Step 3: Moving Lookup Tables to lut directory

Following lookup table files moved from study's lib to lut dir:

aecodes.lut

drugs.lut

investigators.lut

Step 4: Moving Edit Checks code to ecsrc directory

DFedits already exist in ecsrc directory.

Step 5: Converting postscript to png and old tiffs to png

WARNING: PNG files already exist for plates: 1-11, 20.

Study migration was successful.

~~~~~  
DONE:

Migration has been performed on the following study: 254

Please review dfmigrate\_errors for any migration errors

or warnings and/or manual steps that may be required.

~~~~~  
#

In some cases (as in the example above), the background images used by **DFprintdb** will not be automatically converted. If you use **DFprintdb** and get a conversion error, you will need to re-import the backgrounds from the original **PostScript®** or PDF file using **DFsetup**.

Record that the **pre-2014 studies migration completed successfully** on the worksheet [\[\[IMG00\]\]](#).

Load journal files for pre-5.5.0 studies

This step is applicable for **all** studies created prior to version 5.5.0 of DFdiscover. It must be performed by super-user.

DFdiscover requires that studies from all installations prior to 5.5.0 have their journal files loaded into the new DFaudit.db sqlite database.

Upgrading all Studies

- To upgrade all studies on your system, as super-user run:

```
# /opt/dfdiscover/utils/DFauditdb -reload -s all
```

The following shows example output from this command:

```
Processing study 154:
Reading journal files ... 1 seconds
Truncating DFaudit.db ... 0 seconds
Loading to DFaudit.db ... 0 seconds
Adding index to table ... 0 seconds
Study 154: 12752 records in audit database.
```

Record that the **study journal files loaded** on the worksheet [\[\[LJ00\]\]](#).

Load User and Role history for pre-5.9.0 studies

This step is applicable for **ALL DFdiscover** server upgrades. It must be run by either user datafax or root with the -reload option. The reload option empties existing entries and reloads DFuserdb.log to the DFpermlog table in DFadmin.db. This process may take some time to run if DFuserdb.log is large. This process can be performed while **DFdiscover** is running, but ensure no user and role changes are made in **DFadmin** while it is running.

```
# /opt/dfdiscover/utils/DFadmin.db -reload
```

The following shows example output from this command:

```
> Loading userdb log....done (1235 seconds)
136686 userdb log records
17 query restrictions
```

Record that the **User and Role history loaded** on the worksheet [\[\[LD00\]\]](#).

Installation Completed

Congratulations! You have installed **DFdiscover** on your system. There are additional steps to be followed to ensure that your **DFdiscover** system is up-to-date and also to configure the various components. These are outlined in the following chapters.

DFdiscover Configuration

IMPORTANT: These steps are required for a new installation only. If this is an upgrade install, execute

```
# systemctl start dfdiscover.service
```

to restart **DFdiscover**. Then complete [Define DFdiscover capable printer](#) and skip to [Study Installation](#).

This chapter completes the configuration of **DFdiscover**. After completing these steps, **DFdiscover** will be operational.

Define DFdiscover capable printer

DFdiscover is able to print to printers that are either local to the server or networked. The printers must already be configured and named on the **DFdiscover** server, which is typically a **UNIX** administration issue. Given the set of printer names which are known to the system, that complete set, or a subset thereof, needs to be configured in

DFdiscover. This is done by creating the file `/opt/dfdiscover/lib/DFprinters`.

Define **DFdiscover** printers

1. Edit, or create, `/opt/dfdiscover/lib/DFprinters`. Use your favorite editor to edit this file.
2. Add default printer name first. Of all of the printers that have been identified as being **DFdiscover** capable, identify the one that will be the default, and add that printer name as the first line of the file. The order that the names appear in the file dictates the order in which they are displayed in any **DFdiscover** print dialog.
3. Add additional printers, if any. Each additional printer name should be added, one per line, following the default printer name.
4. Save file. Save the changes made to `/opt/dfdiscover/lib/DFprinters` and exit the editor [\[\[DF10\]\]](#).

Start DFdiscover

It's time to **[start the DFdiscover services]** [\[\[DF12\]\]](#). Before doing so confirm that a valid **DFdiscover** license is installed in `/opt/dfdiscover/work/license`.

To start the **DFdiscover** services, type:

```
% /opt/dfdiscover/bin/DFbootstrap
```

The output will be similar to the following:

```
DFmaster.rpcd: your software license expires in 365 days
1. Checking state of incoming daemons...

2. Checking /opt/dfdiscover/work/.dfincoming_work...
0 stale incoming entries obsoleted

3. Checking /opt/dfdiscover/incoming...
0 faxes awaiting processing.
DFmaster.rpcd: started.
Done.
```

The **DFdiscover** services have now been started - continue with the next section. If an error prevents the **DFdiscover** services from starting, it is essential to fix the problem before continuing - the steps in the remaining sections will fail.

The remaining steps in this chapter must be executed by user `datafax`. Exit the super-user shell and become user `datafax`.

Re-configure DFdiscover Master

Start the **DFdiscover** system administration application with the command:

```
% DFadmin
```

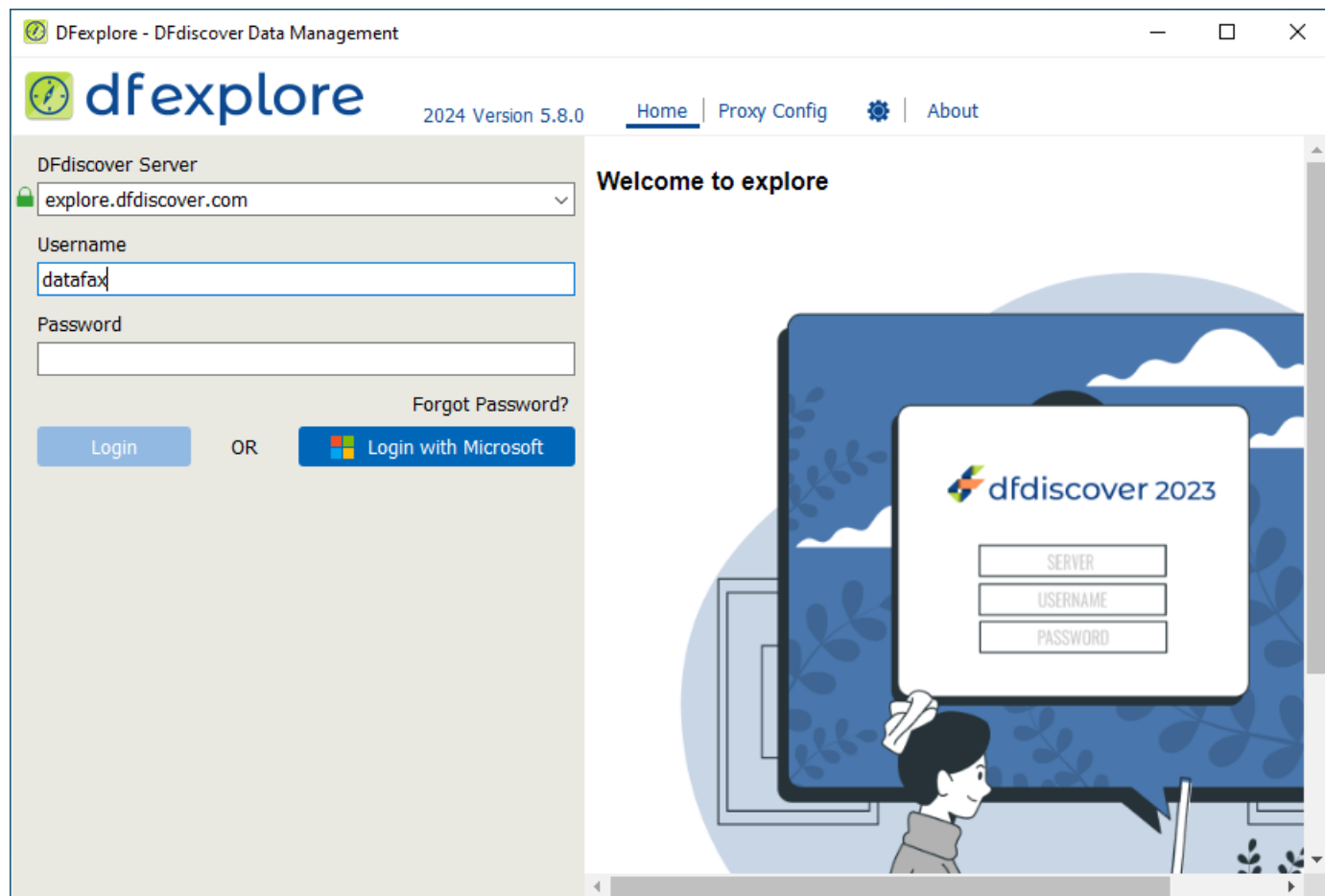
The system administration application is used to configure the **DFdiscover** master process.

[Configure DFdiscover Master] [\[\[DF06\]\]](#)

1. Login to the **DFdiscover** administration application

If this is the first time that the administration application is used, enter the nickname or fully qualified name for the licensed **DFdiscover** server in the **Server** field. The **Login Name** is datafax and the **Password** is passwd (this is a one-time password that must immediately be changed after authentication). Click [Login](#).

Typical login dialog appearance



2. Click **Master** to display the **Master** dialog

A complete description of the dialog and the meaning of the individual fields can be found in [System Administrator Guide, DFadmin - Master](#). Complete the fields as follows.

- a. **Bootstrap Slave Host**

The default value for this field is the hostname of the **DFdiscover** server. If the default is not filled in, enter the hostname. Multiple hostnames (comma-delimited) are only required when multiple **DFdiscover** servers are available.

- b. **Default Printer**

The value of this field is the name of a local printer. Typically, this should be the same default printer defined in [\[DF10\]](#).

Study-specific printers are defined at study creation time.

3. Select **File > Save** to save the changes

The values specified in the dialog are saved.

Configure Incoming and Outgoing Processes

Incoming and outgoing fax processing is handled by third-party software: **DFdiscover** can work with either **HylaFAX** service. Additionally, outbound service can be handled via email. **DFdiscover** communicates with the fax software or service by means of inbound and outbound processes that are configured using **DFadmin**.

At this point [**configure an incoming daemon**] [\[\[DF08\]\]](#) and [**configure an outgoing daemon**] [\[\[DF09\]\]](#). A complete description of the configuration process can be found in [System Administrator Guide, Traffic](#).

Configuration Complete

DFdiscover configuration is now complete. Take this opportunity to update the worksheet. The next chapter describes several optional integration tests that should be completed to demonstrate that the installation is operating in the expected manner.

Integration Testing

The integration tests described in this chapter are recommended but not required. Their purpose is to demonstrate that incoming and outgoing faxing is operational, and that printing is correctly defined.

Receiving Faxes

NOTE: This test is relevant only if incoming faxing is part of your document workflow. If incoming faxing is not configured, this test will fail.

The purpose of this test is to demonstrate that an incoming fax can be received by **DFdiscover**, that it is properly archived, and that it can be viewed in **DFexplore**.

To demonstrate incoming fax operation

1. **[Fax a non-DFdiscover page] from a plain paper machine**

The purpose of this test is not to demonstrate that a CRF can be recognized as a study CRF, and so a simple cover page of any type is preferred. Fax the page from a traditional fax machine to the number that **DFdiscover** will receive faxes on [\[\[IN01\]\]](#).

2. **Monitor the fax modem status lights (HylaFAX only)**

During fax reception, various lights on the modem will flash or be illuminated. On Multitech modems the OH (off-hook) light will be on during the fax reception and the RD (receive data) light will be flashing indicating that information is being received from the sending fax machine. When transmission is complete some of these lights will go out.

3. **[Confirm fax archival]**

Within 30 seconds of the end of transmission, **DFdiscover** will create a new directory under the directory previously defined as the **Archive Directory** by [Configure Incoming and Outgoing Processes](#). The directory name is 4-digits where the first two digits are the year within the century and the last two digits are the week within the year. The contents of the directory will be a single file with a 4-digit name, generally 0001. Confirm that the directory and file are present [\[\[IN02\]\]](#).

Confirmation of fax archival

In this case, the first fax was received on November 14, 2015 (the 46th week of 15). The archive directory

was defined as `/opt/dfdiscover/archive`.

```
% cd /opt/dfdiscover/archive
% ls
1546
% cd 1546
% ls
0001
```

4. [View the fax in DFExplore]

Fax pages that are not barcoded as **DFdiscover** CRFs will be routed to a holding directory for subsequent manual identification.

Start **DFExplore** with the command:

```
% /opt/dfdiscover/bin/DFExplore
```

Authentication is required. Then click [Image Router](#) and confirm that the faxed page or pages are present [\[\[IN03\]\]](#).

5. [Print the page from DFExplore]

Choose **Print** from the **Page** menu. In the Print dialog, select the Printer to which you want to print the page and choose [Print](#) to print the current page.

Confirm that the fax page prints successfully [\[\[IN04\]\]](#).

Completion of this section demonstrates that **DFdiscover** is able to receive faxes and process them.

Printing from DFdiscover

The purpose of this test is to demonstrate that the previous editing done in [Define DFdiscover capable printer](#) was successful.

[Print a plain text file]

1. Identify a plain text file

Any text file will work for this test. The file should not be too large - the purpose of the test is to print a text file, not print hundreds of pages of text. A good default file is `/etc/passwd`.

2. Print the file

From a shell prompt, issue the command:

```
% /opt/dfdiscover/lib/DFprint_filter /etc/passwd
```

possibly substituting ``/etc/passwd`` with the name of the file that you chose to print.

3. Confirm that the text file printed properly [\[\[IN05\]\]](#).

Faxing from DFdiscover

The purpose of this test is to demonstrate proper operation of the previously defined outgoing daemon.

This test will require the fax number of a local paper fax machine to be used as the fax destination.

[Fax a plain text file]

1. Identify a plain text file

Any text file will work for this test. The file should not be too large - the purpose of the test is to fax a text file, not fax hundreds of pages of text. A good default file is `/etc/passwd`.

2. Fax the file

If the installation is configured to send documents via email, issue the command:

```
% DFsendfax /etc/passwd mailto:recipient
```

where *recipient* is the email address to send to. If the installation is configured to fax documents, issue the command:

```
% DFsendfax /etc/passwd faxnumber
```

where *faxnumber* is the fax number of the local paper fax machine.

Depending upon the **Polling Interval** previously specified in the outgoing daemon configuration, it may take up to 60 seconds for **DFdiscover** to pass the queued fax to email or **HylaFAX**.

3. Confirm that the fax was sent successfully

Wait for a few minutes and confirm that the sent fax has arrived at the destination fax machine or email recipient [\[\[IN06\]\]](#).

Study Installation

This chapter is optional, and generally will not be executed at the time of **DFdiscover** installation.

The study installation steps described in this chapter will only apply to **DFdiscover** installations where a new study is ready to be installed at the same time.

A DFdiscover study

To **DFdiscover**, a study definition comprises a parent directory and several sub-directories that hold study specific configuration information. As a result of this structure, a study definition can be easily transported by moving the parent directory to a new location. Everything that is needed by the study is contained within that parent directory.

Installing the study

IMPORTANT: The steps in this section must be executed by super-user.

Studies that are created by DF/Net Research, Inc. are typically distributed via download link, as a UNIX **tar** file. The procedure described here assumes this structure. Studies that are transported from other vendors or from affiliates within a company may be structured differently. This procedure may need to be modified to fit those specific conventions.

Study Installation

1. Pre-requisite: [Create a parent directory for all studies]

Generally, (but this is not a requirement) all **DFdiscover** studies exist under a common parent directory on the **DFdiscover** server. This directory is typically `/opt/studies`. Create the parent directory, if necessary [\[\[SS01\]\]](#):

```
# mkdir -p /opt/studies
```

and update the ownership of the directory so that it is owned by `datafax` and group `studies`:

```
# chown -R datafax /opt/studies
# chgrp -R studies /opt/studies
```

2. [Obtain the study tar image]

The remaining steps assume that the study tar image is available as `/tmp/study.tar` [\[\[SS02\]\]](#).

3. [Create a study folder and extract the contents of the tar image]

A study setup from DF/Net Research, Inc. will be rooted at the study directory and is easily extracted with **tar**. Create the study folder and extract the tar image contents with commands similar to this [\[\[SS03\]\]](#):

```
# cd /opt/studies
# mkdir newstudy
# cd newstudy
# tar xpf /tmp/study.tar
```

Extracting study proto123

```
# cd /opt/studies
# mkdir proto123
# cd proto123
# pwd
/opt/studies/proto123
# tar xpf /tmp/study.tar
bkgd/...
bkgd/...
...
#
```

4. [Update the file permissions and ownership] of the extracted study

The owner and group permissions of the extracted study must be updated to reflect the ids for user `datafax` and group `studies` present on the installed system. Update the permissions with the **chown** and **chgrp** commands [\[\[SS04\]\]](#).

Updating ownership and permissions

```
# cd /opt/studies
# chown -R datafax proto123
# chgrp -R studies proto123
```

5. [Register the study to DFdiscover]

The local **DFdiscover** installation must now be made aware of the new study. This is accomplished by registering a new study with **DFdiscover** as described in [System Administrator Guide, Adding a New Study](#) [\[\[SS05\]\]](#).

Performance of the procedure in this chapter is not required for the installation, but is highly recommended.

The **DFdiscover** Acceptance Test Kit is an important part of installation qualification. It allows the end-user to demonstrate that **DFdiscover** works in a manner that is in accordance with a known set of results.

The installation materials include a printed copy of the Installation and Initialization chapter of the **DFdiscover** Acceptance Test Kit documentation. These instructions represent [**the first of nineteen modules**] in the ATK, and are required for initialization [[\[AT01\]](#)]. A complete description of the remaining modules in the ATK is available after successful completion of the first module. In general, [**completion of all nineteen modules**] of the ATK requires one 8-hour day [[\[AT02\]](#)].

Client Desktop Packages Installation

DFdiscover includes a number of tools which are available for **Windows 10** and **macOS 10.14 (Mojave) or later**. These can be obtained from www.dfnetresearch.com.

The current **Windows 10** packages are:

- DFdiscover_5_10_0.msi, containing **DFexplore**, **DFsetup**, **DFadmin**, **DFbarcode**, **DFATK** and several command-line tools.
- DFexplore_5_10_0.msi, containing only **DFexplore**.
- DFsend_5_10_0.msi, containing only **DFsend**.

The current **macOS 10.14 (Mojave) or later** packages are:

- DFdiscover5.10.0.pkg, containing **DFexplore**, **DFsetup**, **DFadmin**, **DFbarcode**, **DFATK** and several command-line tools.
- DFexplore5.10.0.pkg, containing only **DFexplore**.
- DFsend5.10.0.pkg, containing only **DFsend**.

Windows client packages installation [[\[PK01\]](#)]

Requirements

Installation and proper operation of the Windows client tools requires **Windows 10**.

Installation

The Windows client tools are distributed as Windows msi installer files.

1. Locate the desired client package msi

The file can be found on www.dfnetresearch.com in [software releases support website](#).

2. Install from the desired client package

Double-click the desired client package file. Installation begins automatically and behaves similar to other Windows setup programs. The installer will add icons to the Desktop as well as entries in the **Start > Programs** menu.

NOTE: Installation must be performed on the local drive of each Windows machine that is to run the client tools.

DFdiscover barcoding plug-in for FrameMaker® installation [[PK02](#)]

Requirements

NOTE: The **DFdiscover** Barcode plug-in for **FrameMaker®** is a legacy tool supported for older versions of **FrameMaker®** only. For newer versions, use the **DFbarcode** desktop application instead, available for both Windows and macOS. See [Using the DFbarcode Application](#) for details.

Installation and proper operation of the **DFdiscover** Barcode plug-in requires:

1. FrameMaker 10 through FrameMaker 2017
2. **Windows 10**

Installation

NOTE: Installation must be performed on the local drive of each machine that is running **FrameMaker®**, or on the shared drive if **FrameMaker®** was installed on a shared drive.

The plug-in is distributed as barcodet.dll, a Windows DLL. The file can be found on www.dfnetresearch.com under [My Account - Additional Resources](#).

The DLL must be copied to the fminit directory below the **FrameMaker®** product installation directory. Use the same name for the copied file. For example:

```
C:\copy "barcodet.dll" "C:\Program Files\Adobe\FrameMaker\fminit\barcodet.dll"
```

FrameMaker® Configuration

The **FrameMaker®** installation directory, typically C:\Program Files\Adobe\FrameMaker or C:\Users\username\AppData\Roaming\Adobe\FrameMaker\XX\ (where XX is the version number), contains a product.ini file, typically maker.ini or imaker.ini or fmsgml.ini, depending upon the **FrameMaker®** version. The [APIClients] section of this file lists the clients to load when **FrameMaker®** starts. Each client description is on a separate line and cannot contain line breaks. A default **FrameMaker®** installation will already have an [APIClients] section that ends with:

```
Mailer=Standard, Send Mail API Client, fminit\mailer.dll  
WordCount=DocReport,Count the number of words in the document, fminit\wordcnt.dll  
BookUtils=Standard, Book Utilities, fminit\bookutils.dll
```

Edit the maker.ini file with a text editor, locate the [APIClients] section of the file, and add the following text on a new line at the end of the section:

```
DFdiscover=Standard, DFdiscover Barcode Tool, fminit\barcodet.dll, all
```

Save and exit the maker.ini file. Configuration is complete.

This procedure needs to be repeated on each computer that will use **FrameMaker®** to create CRFs for

Installation Completion

The installation and configuration of **DFdiscover** is now complete.

To complete the documentation:

1. [**Collect together all installation materials**] and store them in a safe place **[[CL01]]**

If necessary, consult [Installation Materials](#) for the complete list.

2. **Were [all required items completed without error] [[CL02]]?**

If there are outstanding items that need input from DF/Net Research, Inc., see [Getting Help](#).

3. [**Sign the completed worksheet**] **[[CL04]]**

The worksheet is an important piece of documentation. Sign it and store it a safe location for future reference.

Thank you for choosing **DFdiscover** and DF/Net Research, Inc.!

DFdiscover Installation Worksheet

Use this worksheet as a permanent record of the installation's progress. When completed, sign and date this worksheet and store it together with any other installation qualification (IQ) materials.

Most of the entries in the worksheet require only a checkmark indicating that the step was completed. Some entries require the value of a parameter to be recorded. It is important to record these parameter values as they are assigned because in some cases they are referenced by subsequent steps.

DFdiscover Software Installation

Staffing

XREF	Description	Completed?
[[SI50]]	[UNIX administrator]	
[[SI51]]	[DFdiscover administrator]	
[[SI52]]	[Study setup]	
[[SI53]]	[Programmer]	
[[SI54]]	[SAS specialist]	
[[SI55]]	[Data entry]	
[[SI56]]	[Higher-level data review]	

Before Installation

XREF	Description	Completed?
[[SI00]]	Company Name	
[[SI01]]	DFdiscover 5.10.0 software release	
[[SI02]]	Date	
[[SI03]]	Contact Person	
[[SI04]]	Server Hostname	
[[SI05]]	Server Operating System	

XREF	Description	Completed?
[[SI08]]	the name of a printer that can be accessed from the DFdiscover environment	
[[SI09]]	www.dfnetresearch.com can be accessed	
[[SI57]]	send email externally, for example to DF/Net Research, Inc. (help@dfnetresearch.com)	

Installation Materials

XREF	Description	Value
[[SI13]]	[installation notes]	
[[SI14]]	[super-user password]	
[[SI15]]	[current DFdiscover software release]	
[[SI16]]	[current DFdiscover Release Notes]	
[[SI18]]	[Installation and Initialization chapter of the DFdiscover Acceptance Test Kit documentation]	
[[SI21]]	[DFdiscover License Renewal form]	

XREF	Description	Value
[[SI37]]	[hostid]	
[[SI38]]	[hostname]	
[[SI39]]	[# of users]	
[[SI40]]	[expiry date]	
[[SI42]]	[features]	
[[SI41]]	[password]	
[[SI22]]	[support username]	
[[SI23]]	[support password]	

XREF	Description	Value
[[SI24]]	[studyssetup]	

Installation for Linux Systems

XREF	Description	Value
[[SI32]]	[installation directory]	
[[LX00]]	[Linux installation completed successfully]	

Request and Install Server Certificate

XREF	Description	Value
[[CI01]]	[Use DFserveradmin to create the certificate request]	
[[CI02]]	[Save the signed certificate]	

Request and Install **DFdiscover** License

XREF	Description	Value
[[LI01]]	[server identifier]	
[[LI03]]	[Save the license]	
[[LI04]]	[Update hostname in DFdiscover License]	

Migration of pre-2014 studies

If you do not have any pre-2014 studies to migrate, cross out this section.

XREF	Description	Value
[[MG00]]	[pre-2014 studies migration completed successfully]	

Load Journal files for pre-5.5 studies

If you do not have any pre-5.5 studies to migrate (e.g. you are a new customer with no studies), cross out this section.

XREF	Description	Value
[[LJ00]]	[study journal files loaded]	

User and Role history loaded for pre-5.8 studies

If you do not have any pre-5.8 users or roles to migrate (e.g. you are a new customer with no studies), cross out this section.

XREF	Description	Value
[[LD00]]	[user and role history files loaded]	

DFdiscover Configuration

XREF	Description	Completed?
[[DF10]]	[Define DFdiscover printers]	

Start **DFdiscover**

XREF	Description	Completed?
[[DF12]]	[start the DFdiscover services]	

(Re-)configure **DFdiscover** Master

XREF	Description	Completed?
[[DF06]]	[Configure DFdiscover Master]	

Configure Incoming and Outgoing Daemons

XREF	Description	Completed?
[[DF08]]	[configure an incoming daemon]	
[[DF09]]	[configure an outgoing daemon]	

Integration Testing

Receiving Faxes

XREF	Description	Completed?
[[IN01]]	[Fax a non- DFdiscover page]	
[[IN02]]	[Confirm fax archival]	
[[IN03]]	[View the fax in DFexplore]	
[[IN04]]	[Print the page from DFexplore]	

Printing from **DFdiscover**

XREF	Description	Completed?
[[IN05]]	[Print a plain text file]	

Faxing from **DFdiscover**

XREF	Description	Completed?
[[IN06]]	[Fax a plain tex file]	

Study Installation

Installing the study

XREF	Description	Completed?
[[SS01]]	[Create a parent directory for all studies]	
[[SS02]]	[Obtain the study tar image]	
[[SS03]]	[Create a study folder and extract the contents of the tar image]	
[[SS04]]	[Update the file permissions and ownership]	
[[SS05]]	[Register the study to DFdiscover]	

DFdiscover Acceptance Test Kit (ATK) Installation

XREF	Description	Completed?
[[AT01]]	[the first of nineteen modules]	
[[AT02]]	[completion of all nineteen modules]	

Client Desktop Package Installation

XREF	Description	Completed?
[[PK01]]	[Windows client packages]	
[[PK02]]	[DFdiscover barcoding plug-in for FrameMaker®]	

Installation Completion

XREF	Description	Completed?
[[CL01]]	[Collect together all installation materials]	
[[CL02]]	[all required items completed without error]	
[[CL04]]	[Sign the completed worksheet]	

Completion Sign-off

Vendor representative.

Name:	
Title:	
Signature:	
Date:	

Client representative.

Name:	
Title:	
Signature:	
Date:	

Administering DFws

This chapter guides a system administrator through the process of installing and starting the DFdiscover API server, **DFws**. The system administrator is expected to have good knowledge of administering a UNIX system.

Installing DFws

DFws is supported on Novell openSUSE version 13.2 and newer, Leap 42.1 and newer, SUSE Tumbleweed and Redhat Enterprise Linux (CentOS) versions 8.X and 9.X. **DFws** is a 64-bit server application - it installs on the 64-bit versions of any of these Linux distributions. It will not run on 32-bit systems. Other Linux distributions may work, but are unsupported. Debian distributions such as Ubuntu will not work at this time. CentOS and Oracle Linux are clones of RHEL and will work as expected.

Before installing **DFws**, confirm that the file descriptor limit is set to at least 65535. Confirm the current setting with the command:

```
# ulimit -a
```

The output will include a setting for open files. Update this value to 65535, by editing the system file, `/etc/sysctl.conf`. The setting in the file must be set to

```
fs.file-max=65535
```

If the setting is not present in the file, add it as a new line to the bottom of the file. If the setting is already defined and set to a higher value, do not change it. Otherwise, update it as indicated. If the file is changed, advise the system of the change with the command:

```
# sysctl -p
```

A complete installation requires approximately 370 Mb of free disk space for the software and documentation. The software is installed in `/opt/dfws`.

To install:

procedure 1. The **DFws** rpm is available from the DFnet website, www.dfnetresearch.com, specifically [software releases support website](#).

Download the installation rpm, ``dfws-5.10-0.x86_64.rpm``, to a suitable location on the local server.

2. Install the downloaded rpm. Change directories to the location where the rpm was downloaded. Assuming that you have downloaded the rpm to the /tmp directory,

```
# cd /tmp
```

Execute the installation command appropriate for the operating system.

- On openSUSE, use **zypper**, which will automatically download and install any dependencies required:

```
# zypper --no-gpg-checks install dfws-5.10-0.x86_64.rpm
```

- On RHEL, use **dnf**, which will automatically download and install any dependencies required:

```
# dnf --nogpgcheck install dfws-5.10-0.x86_64.rpm
```

The software is installed in the /opt/dfws directory.

NOTE: RHEL 9.X ships with OpenSSL 3.0 system libraries by default, during **DFdiscover** installation OpenSSL 1.1 (compat-openssl11) libraries will be installed.

DFws Configuration File

DFws is configured via properties in the /opt/dfws/dfws.cf file. Refer to [DFws Configuration File](#), [DFws User Guide](#) for full details.

DFws System Database

While **DFws** is operational, it manages two tables in its system database. If not already present, the SQLite database *DFWS_DATABASE* is created with the required tables and default accounts. The database has two tables: one for API client accounts, *DF_DEVELOPERS*, and one for message logging, *DF_LOG*.

DF_DEVELOPERS Table Definition

API clients must be provided with login credentials (*CLIENT_ID*, *CLIENT_PASS*, *CLIENT_SECRET* and API server Base URI) to use the API.

The *DF_DEVELOPERS* table contains the following information:

Field	Type / Size	Description
DFDEVID	Integer	Numeric ID (Primary Key)
DFLOGIN	String (16)	Unique login name CLIENT_ID
DFPASSWORD	String (50)	Password CLIENT_PASS
DFSECRETKEY	String (50)	Secret passcode CLIENT_SECRET
DFADMIN	Integer	Account privileges (0=client, 1=admin)
DFSTATUS	Integer	Account status (0 = disabled, 1=enabled)
DFEXPIRY	YYYYMMDDHHMMSS	Timestamp of account expiry
DFLASTACCESS	YYYYMMDDHHMMSS	Timestamp of last successful login

The **DFws** admin must create an account for each new API client by adding records to the DF_DEVELOPERS table. This is done using **DFwsadmin**. Typically, API clients are defined for one year. After creation, the **DFws** admin must also maintain the validity of each client by refreshing the expiry date.

The default datafax:passwd account is created by **DFws** on first launch, and is valid for 24 hours.

DF_LOG Table Definition

Configured by the value of the DFWS_LOG_THRESHOLD parameter, **DFws** logs key events such as unauthorized requests, invalid tokens or invalid requests to the DF_LOG table. The value is a code from the list: 0=Fatal, 1=Critical, 2=Warning, 3=Verbose, 4=Info. The specified value is cumulative so that each number includes itself and all lower numbers.

The DF_LOG table contains the following information:

Field	Type / Size	Description
DFTIMESTAMP	YYYYMMDDHHMMSS	Timestamp of log entry
DFTYPE	Integer	Type of log message reported (0=Fatal, 1=Critical, 2=Warning, 3=Verbose, 4=Info)
DFMESSAGE	String (150)	Text message
DFPEER	String (100)	IP address of the client system that sent the request
DFURI	String (150)	URI of the API request
DFMETHOD	String(10)	HTTP Method of the request (GET, POST, LOCK, UNLOCK, DELETE)
DFDEVLOGIN	String(16)	Client ID of the client that made the request
DFUSER	String(16)	DFdiscover username used to authorize the session
DFSTATUS	Integer	HTTP Response status code

DFwsadmin can be used to examine the contents of the table. There is also an API request available, see [???](#).

Starting and Stopping DFws

DFws is configured as a systemd service. Use **systemctl** to start and stop **DFws** and to enable the daemon to automatically restart on a system reboot. To start **DFws**:

```
# systemctl start dfws.service
```

To stop **DFws**:

```
# systemctl stop dfws.service
```

To enable automated start of **DFws** on reboot:

```
# systemctl enable dfws.service
```

To disable automated start of **DFws** on reboot:

```
# systemctl disable dfws.service
```

To determine the current status of **DFws**:

```
# systemctl status dfws.service
```

A running **DFws** server will process requests, encrypted using SSL, over the specified DFWS_PORT port. For **DFws** developers, the base URI to send requests is:

https://{SERVER_HOSTNAME}:{DFWS_PORT}/dfws/v5

Monitoring DFws Activities

Once **DFws** is available, your developers will expect that they can access it 24x7. While there is very little that requires active attention, it is important to monitor it on a regular basis. To most effective solution for monitoring **DFws** is the companion, command-line executable, **DFwsadmin**.

Using DFwsadmin

DFwsadmin is a command-line application that is installed with **DFws**. It is available for use by the system super-user on the **DFws** server.

DFwsadmin offers 3 broad types of interaction and information:

- Client account addition/deletion/update/review
- Log review and deletion
- **DFws** status

API Client Account Management

API client accounts are managed with the following commands:

```
# DFwsadmin add -client id -pass password -secret key
    [-status 1|0] [-admin Y|N] [-expiry days]
# DFwsadmin modify id [-client id] [-pass password] [-secret key]
    [-status 1|0] [-admin Y|N] [-expiry days]
# DFwsadmin delete id
# DFwsadmin show [-decode] [id]
```

Account Format

The API client accounts output has the following format:

```
CLIENTID|PASSWORD|SECRET|ADMIN|STATUS|EXPIRYDATE|LASTACCESSED
php_client|****|****|Y|Enable|20200102101541|20181231000000
nodejs_client|****|****|N|Disable|20200102092239|20181231000000
testapi|****|****|N|Disable|20200104092321|20181231000000
collectapp|****|****|N|Enable|20200111160239|20190111160239
webapp|****|****|N|Enable|20200111160336|20190111160336
```

- CLIENTID is unique login name for the API client
- PASSWORD is password for the API client
- SECRET is secret passcode for the API client to encode JWT tokens
- ADMIN is administrative privileges setting for the API client
- STATUS is client account status of being enabled or disabled
- EXPIRYDATE is the client account expiry date (YYYYMMDDHHMMSS)
- LASTACCESSED is the timestamp of last successful client log-in (YYYYMMDDHHMMSS)

Log Management

Activity on the **DFws** server is monitored with these commands:

```
# DFwsadmin showlog [-oldest|newest #] [-peer peer] [-client id]
    [-status status] [-contain message] [-type log_type]
    [-from date] [-to date] [-user username]]
# DFwsadmin clearlog [-oldest|newest #] [-peer peer] [-client id]
    [-status status] [-contain message] [-type log_type]
    [-from date] [-to date] [-user username]]
```

Log Format

The log output has the following format:

```
LOGDATE|TYPE|MESSAGE|PEER|URI|METHOD|CLIENTID|USER|STATUS
20190116153756300|3|Invalid API call|::ffff:192.168.4.223|dfws/v5/logs|GET||503
20190116153028603|1|Attempt to access session owned by another api-client:
dfphp|::ffff:192.168.4.223|dfws/v5/studies/154/records/1001/0/1|GET|DFweb||401
20190116150951215|1|Invalid authorization
token|::ffff:192.168.4.223|dfws/v5/authorize|POST|dfphp||401
```

- LOGDATE format is YYYYMMDDHHMMSSZZZ, where ZZZ is milliseconds (zero padded)
- TYPE is the type of log message reported, from the list 0=Fatal, 1=Critical, 2=Warning, 3=Verbose, 4=Info
- PEER is the IP address of the client machine that sent the request
- URI is the request sent by the client
- METHOD is the HTTP method of the request from the list: GET, POST, LOCK, UNLOCK, or DELETE
- CLIENTID is the ID of client sending the request
- USER is DFdiscover username used to authorize the session associated with current request
- STATUS is HTTP response status code (generally an HTTP error code) returned by API server for the request

System Status

To determine the current status of **DFws**, use the command:

```
# DFwsadmin apistatus
```

Output is one of:

```
DFws API server is not running.
```

or

```
DFws API server is running.
```

Additionally, information about the number of active client sessions is written to the system log in the following format:

DFweb Installation

This chapter guides a system administrator through the process of installing and starting the DFweb server, **DFweb**. The system administrator is expected to have good knowledge of administering a UNIX system.

Installing DFweb

NOTE: **DFweb** requires the installation of Nodejs (<https://nodejs.org>). The Nodejs version 18.16.X LTS version is recommended. Other Nodejs versions may work, but are unsupported.

DFweb is supported on Novell openSUSE version 13.2 and newer, Leap 42.1 and newer, SUSE Tumbleweed and Redhat Enterprise Linux (CentOS) versions 8.X and 9.X. **DFweb** is a 64-bit server application - it installs on the 64-bit versions of any of these Linux distributions. It will not run on 32-bit systems. Other Linux distributions may work, but are unsupported. Debian distributions such as Ubuntu will not work at this time. CentOS and Oracle Linux are clones of RHEL and will work as expected.

A complete installation requires approximately 270 Mb of free disk space for the software. The software is installed in /opt/dfweb and installs **DFweb** as a **systemd** service.

Installing **DFweb**:

1. The **DFweb** rpm is available from the DFnet website, www.dfnetresearch.com, specifically [software releases support website](#).

Download the installation rpm, dfweb-5.10-0.x86_64.rpm, to a suitable location on the local server. Login to your server as "root".

2. If this is an upgrade, stop **DFweb**.

```
# systemctl stop dfweb
```

or

```
# zypper stop dfweb
```

3. Install the downloaded rpm. Change directories to the location where the rpm was downloaded. Assuming that you have downloaded the rpm to the /tmp directory,

```
# cd /tmp
```

Execute the installation command appropriate for the operating system.

- On openSUSE, use **zypper**, which will automatically download and install any dependencies required:

```
# zypper --no-gpg-checks install dfweb-5.10-0.x86_64.rpm
```

- On RHEL, use **dnf**, which will automatically download and install any dependencies required:

```
# dnf --nogpgcheck install dfweb-5.10-0.x86_64.rpm
```

The software is installed in the /opt/dfweb directory.

Configuring DFweb

NOTE: The following applies to new installations of **DFweb**. Existing definitions for the `/opt/dfweb/environment.json` file and/or `dfweb.service` file are preserved during upgrades of **DFweb**.

Newly added configuration parameters introduced in recent versions — such as `cspWhitelist` (added in **DFweb 5.10.0**) — are **not automatically added** during upgrades. It is recommended to manually review and update your `environment.json` file to include these new parameters if applicable to your environment.

DFweb uses the default DFws (API) services via setting the FQDN and port address property in the `/opt/dfweb/environment.json` file. If you are self hosting **DFweb** & **DFws** (API) services the `/opt/dfweb/environment.json` file requires modification to use your local **DFws** (API) FQDN for your environment.

Starting with **DFweb 5.9.0**, users can no longer use `localhost` or static IP addresses (e.g., `127.0.0.1`, `192.168.x.x`) to access **DFdiscover** servers. All **DFdiscover** instances must be configured to utilize Fully Qualified Domain Names for the server naming conventions in order to be used on **DFweb**.

IMPORTANT: If you are Self hosting **DFweb** and **DFws** (API) services. All **New installations** require a **DFweb** username and password combination to be defined in the `/opt/dfws/dfws.db` file. To obtain the necessary credentials for the API account, please contact help@dfnetresearch.com.

The below is an example `environment.json` file containing the configurable parameters. The default file includes the `dfws` parameter only.

```
{  
  
  "dfws": "dfws.dfdiscover.com:4433",  
  "ip": "x.x.x.x",  
  "port": "443",  
  "allowSSRF": false,  
  "cspWhitelist": "cdn-aus.dfdiscover.com cdn-eu.dfdiscover.com"  
  
}
```

Configurable Property	Description
dfws	This parameter specifies the API server name along with the port if applicable.
ip	Optional ip address used to listen for requests. This parameter is required only if DFweb is installed on a server with multiple NICs and is sharing the system with DFdiscover or DFws . This avoids conflicts with services that might otherwise share the same IP/port combination.
port	Optional Port number used to listen for requests. Default value is 443. If you are running DFweb on the same system as your DFdiscover OR DFws server, do not use 443 as the port unless you have enabled the above ip property in the <code>/opt/dfweb/environment.json</code> file OR <code>Environment=IP=x.x.x.x</code> in the <code>dfweb.service</code> file. - this will disrupt the existing client / server communication. <div style="border: 1px solid black; padding: 5px; background-color: #e6f2ff;">NOTE: Alternatively the <code>dfweb.service</code> file can also be utilized.</div>
allowSSRF	Set this optional parameter to true if you want to disable Server-Side Request Forgery (SSRF) protection. SSRF is a type of server exploit, and the built in DFweb protections must be enabled whenever possible. In very rare cases the SSRF protection may interfere with clients trying to access the server, and this property can be used to work around those issues. The default is false.
cspWhitelist	Set this optional parameter to specify trusted CDN or asset URLs that should be allowed by the Content Security Policy (CSP) headers. The default value is <code>cdn.dfdiscover.com</code> . You can enter multiple URLs separated by spaces to allow additional sources if needed. This is useful if your application uses other CDNs or external resources that are being blocked by CSP.

CAUTION: **DFweb** defaults to port 443 for stand-alone installations. When **DFweb** shares the system with **DFdiscover** or **DFws**, either the `/opt/dfweb/environment.json` file or `/etc/systemd/system/dfweb.service` file must be modified to avoid IP/port conflicts by adjusting the default IP or port. For example, set a different IP if using the same port or change the port if sharing the same IP.

NOTE: The default IP and PORT can be set in either the `/opt/dfweb/environment.json` or `/etc/systemd/system/dfweb.service` file. The defined variable settings in `/opt/dfweb/environment.json` will take precedence over the settings located in the `/etc/systemd/system/dfweb.service` file.

The below is an example `dfweb.service` file containing the configurable parameters. The default file does not

include the IP or PORT variables.

```
[Unit]
After=network-online.target nss-lookup.target

[Service]
Environment=IP=X.X.X.X
Environment=PORT=8443
Environment=NODE_ENV=production
Environment=NODE_OPTIONS=--tls-cipher-
list="TLS_CHACHA20_POLY1305_SHA256:TLS_AES_128_GCM_SHA256:ECDHE-ECDSA-AES256-
GCM-SHA384:ECDHE-RSA-AES256-GCM-SHA384:
ECDHE-RSA-CHACHA20-POLY1305:ECDHE-ECDSA-AES128-GCM-SHA256:ECDHE-ECDSA-
CHACHA20-POLY1305:ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-AES128-GCM-SHA256"
ExecStart=/usr/bin/node --tls-min-v1.2 /opt/dfweb/dist/server/app.js
WorkingDirectory=/opt/dfweb
Restart=always
StandardOutput=syslog
StandardError=syslog
SyslogIdentifier=dfweb
User=root
Group=root

[Install]
WantedBy=multi-user.target
```

The configurable properties of the dfweb.service file are as follows:

Configurable Property	Description
IP	<p>Optional ip address used to listen for requests. This parameter is required only if DFweb is installed on a server with multiple NICs and is sharing the system with DFdiscover or DFws. This avoids conflicts with services that might otherwise share the same IP/port combination.</p> <p>Environment=IP=X.X.X.X</p>
PORT	<p>DFweb uses the default PORT of 443. If DFweb is installed on the same system as your DFdiscover OR DFws server, do not use 443 as the port unless you have enabled the above IP property in the dfweb.service file. - this will disrupt the existing client/server communication. Alternative ports can be specified in the dfweb.service file as follows.</p> <p>Environment=PORT=8443</p>
NODE_OPTIONS	<p>A comma-delimited list of ciphers used for secure communication. DFweb ships with the current recommended list of ciphers based upon widely-accepted best security practices. The list can be edited as needed to add newer ciphers (should they become available after the DFweb release). A good, albeit technical, reference for this can be found here as well as an up-to-date list of recommended ciphers</p>

Confirm you have commercial certificates installed in the below directories required by **DFweb**.

```
# /etc/ssl/certs/server.crt
# /etc/ssl/private/server.key
```

Starting and Stopping DFweb

DFweb is configured as a systemd service. Use **systemctl** to start and stop **DFweb** and to enable the daemon to automatically restart on a system reboot. To start **DFweb**:

```
# systemctl start dfweb.service
```

To stop **DFweb**:

```
# systemctl stop dfweb.service
```

To enable automated start of **DFweb** on reboot:

```
# systemctl enable dfweb.service
```

To disable automated start of **DFweb** on reboot:

```
# systemctl disable dfweb.service
```

To determine the current status of **DFweb**:

```
# systemctl status dfweb.service
```

System Status

To determine the current status of **DFweb**, use the command:

```
# systemctl status dfweb.service
```

Output is:

```
* dfweb.service
Loaded: loaded (/etc/systemd/system/dfweb.service; enabled; vendor preset: disabled)
Active: active (running) since Thu 2023-05-25 04:30:41 EDT; 4h 48min ago
Main PID: 10325 (node)
CGroup: /system.slice/dfweb.service
        └─10325 /usr/bin/node --tls-min-v1.2 /opt/dfweb/dist/server/app.js

May 25 04:30:41 explore.dfdiscover.com systemd[1]: Started dfweb.service.
May 25 04:30:42 explore.dfdiscover.com dfweb[10325]: Express server listening on 8443, in production mode
```

DFengage Web Installation

This chapter guides a system administrator through the process of installing and starting the DFengage web server, **DFengage Web**. The system administrator is expected to have good knowledge of administering a UNIX system.

Installing DFengage Web

NOTE: **DFengage** requires the installation of Nodejs (<https://nodejs.org>). The Nodejs version 18.16.X LTS version is recommended. Other Nodejs versions may work, but are unsupported.

DFengage web is supported on Novell openSUSE version 13.2 and newer, Leap 42.1 and newer, SUSE Tumbleweed and Redhat Enterprise Linux (CentOS) versions 8.X and 9.X. **DFengage web** is a 64-bit server application - it installs on the 64-bit versions of any of these Linux distributions. It will not run on 32-bit systems. Other Linux distributions may work, but are unsupported. Debian distributions such as Ubuntu will not work at this time. CentOS and Oracle Linux are clones of RHEL and will work as expected.

A complete installation requires approximately 270 Mb of free disk space for the software. The software is installed in /opt/dfengage and installs **DFengage web** as a **systemd** service.

Installing **DFengage web**:

1. The **DFengage web** rpm is available from the DFnet website, www.dfnetresearch.com, specifically [software releases support website](#).

Download the installation rpm, dfengage-2.4-0.x86_64.rpm, to a suitable location on the local server. Login to your server as "root".

2. If this is an upgrade, stop **DFengage web**.

```
# systemctl stop dfengage.service
```

or

```
# zypper stop dfengage.service
```

3. Install the downloaded rpm. Change directories to the location where the rpm was downloaded. Assuming that you have downloaded the rpm to the /tmp directory,

```
# cd /tmp
```

Execute the installation command appropriate for the operating system.

- On openSUSE, use **zypper**, which will automatically download and install any dependencies required:

```
# zypper --no-gpg-checks install dfengage-2.4-0.x86_64.rpm
```

- On RHEL, use **dnf**, which will automatically download and install any dependencies required:

```
# dnf --nogpgcheck install dfengage-2.4-0.x86_64.rpm
```

The software is installed in the /opt/dfengage directory.

Configuring DFengage Web

NOTE: The following applies to new installations of **DFengage**. Existing definitions for the /opt/dfengage/environment.json file and/or dfengage.service file are preserved during upgrades of **DFengage**.

DFengage web 2.4.0, users are unable to use **localhost** or static IP addresses (e.g., 127.0.0.1, 192.168.x.x) to access **DFdiscover** servers. All **DFdiscover** instances must be configured to utilize Fully Qualified Domain Names for the server naming conventions in order to be used on **DFengage**.

IMPORTANT: If you are Self hosting **DFengage** and **DFws** (API) services. All **New installations** require a **DFengage** username and password combination to be defined in the /opt/dfws/dfws.db file. To obtain the necessary credentials for the API account, please contact help@dfnetresearch.com.

The below is an example environment.json file containing the configurable parameters. The default file includes the dfws parameter only.

```
{  
  "ip": "x.x.x.x",  
  "port": "443",  
  "allowSSRF": false  
}
```

Configurable Property	Description
ip	Optional ip address used to listen for requests. This parameter is required only if DFengage web is installed on a server with multiple NICs and is sharing the system with DFdiscover or DFws . This avoids conflicts with services that might otherwise share the same IP/port combination.
port	Optional Port number used to listen for requests. Default value is 443. If you are running DFengage web on the same system as your DFdiscover OR DFws server, do not use 443 as the port unless you have enabled the above ip property in the <code>/opt/dfengage/environment.json</code> file OR <code>Environment=IP=x.x.x.x</code> in the <code>dfengage.service</code> file. - this will disrupt the existing client / server communication. <div style="border: 1px solid black; padding: 5px; background-color: #e6f2ff;">NOTE: Alternatively the <code>dfengage.service</code> file can also be utilized.</div>
allowSSRF	Set this optional parameter to true if you want to disable Server-Side Request Forgery (SSRF) protection. SSRF is a type of server exploit, and the built in DFengage protections must be enabled whenever possible. In very rare cases the SSRF protection may interfere with clients trying to access the server, and this property can be used to work around those issues. The default is false.

CAUTION: **DFengage web** defaults to port 443 for stand-alone installations. When **DFengage** shares the system with **DFdiscover** or **DFws** or **DFweb**, either the `/opt/dfengage/environment.json` file or `/etc/systemd/system/dfengage.service` file must be modified to avoid IP/port conflicts by adjusting the default IP or port. For example, set a different IP if using the same port or change the port if sharing the same IP.

NOTE: The default IP and PORT can be set in either the `/opt/dfengage/environment.json` or `/etc/systemd/system/dfengage.service` file. The defined variable settings in `/opt/dfengage/environment.json` will take precedence over the settings located in the `/etc/systemd/system/dfengage.service` file.

The below is an example `dfengage.service` file containing the configurable parameters. The default file does not include the IP or PORT variables.

```
[Unit]
After=network-online.target nss-lookup.target

[Service]
Environment=IP=X.X.X.X
Environment=PORT=8443
Environment=NODE_ENV=production
Environment=NODE_OPTIONS=--tls-cipher-
list="TLS_CHACHA20_POLY1305_SHA256:TLS_AES_128_GCM_SHA256:ECDHE-ECDSA-AES256-
```

```

GCM-SHA384:ECDHE-RSA-AES256-GCM-SHA384:
ECDHE-RSA-CHACHA20-POLY1305:ECDHE-ECDSA-AES128-GCM-SHA256:ECDHE-ECDSA-
CHACHA20-POLY1305:ECDHE-RSA-AES128-GCM-SHA256:ECDHE-ECDSA-AES128-GCM-SHA256"
ExecStart=/usr/bin/node --tls-min-v1.2 /opt/dfengage/dist/server/app.js
WorkingDirectory=/opt/dfengage
Restart=always
StandardOutput=syslog
StandardError=syslog
SyslogIdentifier=dfengage
User=dfengage
Group=dfengage

[Install]
WantedBy=multi-user.target

```

The configurable properties of the dfengage.service file are as follows:

Configurable Property	Description
IP	<p>Optional ip address used to listen for requests. This parameter is required only if DFengage web is installed on a server with multiple NICs and is sharing the system with DFdiscover or DFws. This avoids conflicts with services that might otherwise share the same IP/port combination.</p> <p>Environment=IP=X.X.X.X</p>
PORT	<p>DFengage web uses the default PORT of 443. If DFengage web is installed on the same system as your DFdiscover OR DFws OR DFweb server, do not use 443 as the port unless you have enabled the above IP property in the DFengage.service file. - this will disrupt the existing client/server communication. Alternative ports can be specified in the dfengage.service file as follows.</p> <p>Environment=PORT=8443</p>
NODE_OPTIONS	<p>A comma-delimited list of ciphers used for secure communication. DFengage web ships with the current recommended list of ciphers based upon widely-accepted best security practices. The list can be edited as needed to add newer ciphers (should they become available after the DFengage web release). A good, albeit technical, reference for this can be found here as well as an up-to-date list of recommended ciphers</p>

Confirm you have commercial certificates installed in the below directories required by ****DFengage* web***.

```

# /etc/ssl/certs/server.crt
# /etc/ssl/private/server.key

```

Starting and Stopping DFengage

DFengage web is configured as a systemd service. Use **systemctl** to start and stop **DFengage web** and to enable the daemon to automatically restart on a system reboot. To start **DFengage web**:

```
# systemctl start dfengage.service
```

To stop **DFengage web**:

```
# systemctl stop dfengage.service
```

To enable automated start of **DFengage web** on reboot:

```
# systemctl enable dfengage.service
```

To disable automated start of **DFengage web** on reboot:

```
# systemctl disable dfengage.service
```

To determine the current status of **DFengage web**:

```
# systemctl status dfengage.service
```

System Status

To determine the current status of **DFengage web**, use the command:

```
# systemctl status dfengage.service
```

Output is:

```
* dfengage.service
Loaded: loaded (/etc/systemd/system/dfengage.service; enabled; vendor preset: disabled)
Active: active (running) since Tues 2025-11-04 04:30:41 EDT; 4h 48min ago
Main PID: 10325 (node)
CGroup: /system.slice/dfengage.service
        └─10325 /usr/bin/node --tls-min-v1.2 /opt/dfengage/dist/server/app.js

May 25 04:30:41 explore.dfdiscover.com systemd[1]: Started dfengage.service.
May 25 04:30:42 explore.dfdiscover.com dfengage[10325]: Express server listening on 8443, in
production mode
```

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The copyright information for each is provided below. If you would like to receive source codes of these third-party components, please send us your request at help@dfnetresearch.com.

DCMTK software package

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Jansson

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Mimencode

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RSA Data Security, Inc., MD5 message-digest algorithm

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mpack/munpack

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PostgreSQL

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This package is an SSL implementation written by Eric Young (ey@cryptsoft.com). The implementation was written so as to conform with Netscapes SSL.

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d3.js

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jwt-cpp

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QXlsx

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