

RSNA Medical Imaging Resource Community (MIRC)

Teaching File System (TFS) User Guide

Since 2000, RSNA has supported the development of a set of free software tools for education and research in radiology. Those tools are now available through a user-led open source development project, the Medical Imaging Resource Community (MIRC).

The MIRC **Teaching Files System (TFS)** enables any radiology site to implement a locally controlled platform for producing and managing teaching files. TFS features a robust case authoring tool that lets you create teaching files for a variety of educational settings from personal and departmental case files to quizzes and conferences. It allows authors to incorporate full DICOM data sets and control access by individuals and groups of users. It can receive images directly from PACS and keep them private to the author until the case is ready for sharing. Set up is simple and TFS runs on any standard PC or server.

Use TFS to:

- Build a departmental teaching file that supports resident training and lifelong learning
- Create case files in formats ideally suited for peer education and personal review
- Transfer images from PACS to the TFS authoring environment conveniently and with full protection of patient information
- Create virtual conferences from case collections for tumor boards or quality assurance
- Export teaching files as PowerPoint-compatible presentation slides

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Installing TFS



Watch Video Instructions

<https://vimeo.com/74464902>

The RSNA Teaching File System (TFS) software is a Java program that can run on the most common computer operating systems (Linux, Mac OS and Windows). Typically, TFS runs on a computer within a radiology department, on the same network and with the same security protections as the department's clinical systems. Personal TFS sites can also be set up on an individual's laptop or PC.

Installation and operation of TFS on any platform is essentially identical. The installation instructions below assume that installers are comfortable with the basic functions of their chosen operating system, including how to download and find files in its directory system and launch programs.

System requirements:

TFS will run on most computers manufactured after 2008, with Windows XP or later or equivalent era Mac OS and Linux versions as operating systems.

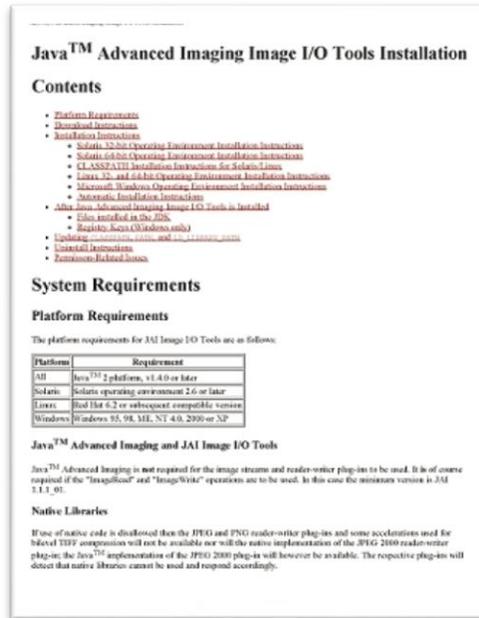
Download and Install Java JRE and Java Advanced Imaging ImageIO Tools:

1. First install the Java Runtime Environment (JRE)[™], which can be found on [the Oracle® website here](#). After accepting the license agreement (use of the JRE is free), download and install the file: Windowsx86 (32-bit) Offline.

Product / File Description	File Size	Download
Linux x86 (32-bit)	19.96 MB	jre-7u3-linux-i586.rpm
Linux x86 (32-bit)	32.29 MB	jre-7u3-linux-i586.tar.gz
Linux x64 (64-bit)	20.3 MB	jre-7u3-linux-x64.rpm
Linux x64 (64-bit)	30.93 MB	jre-7u3-linux-x64.tar.gz
Solaris x86 (32-bit)	35.12 MB	jre-7u3-solaris-i586.tar.gz
Solaris SPARC (32-bit)	39.46 MB	jre-7u3-solaris-sparc.tar.gz
Solaris SPARC (64-bit)	12.13 MB	jre-7u3-solaris-sparcv9.tar.gz
Solaris x64 (64-bit)	9.09 MB	jre-7u3-solaris-x64.tar.gz
Windows x86 (32-bit) Online	0.85 MB	jre-7u3-windows-i586-iftw.exe
Windows x86 (32-bit) Offline	19.38 MB	jre-7u3-windows-i586.exe
Windows x64 (64-bit)	20.48 MB	jre-7u3-windows-x64.exe

Installing TFS

- Next **download** the [Java Advanced Imaging ImageIO Tools here](#).



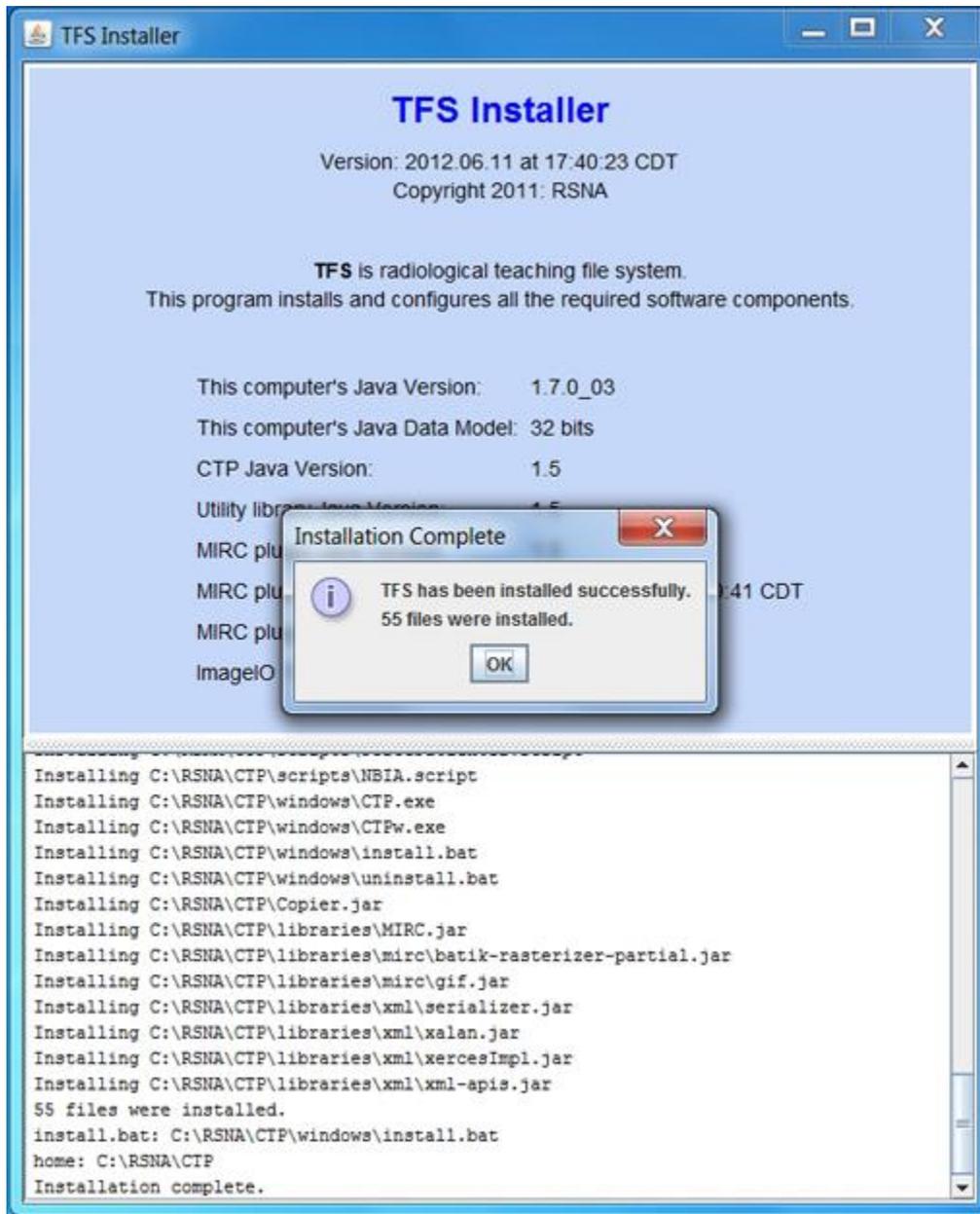
Download and Install TFS

- Download the TFS installer (a Java .jar file) from the RSNA MIRC site. [Click here](#) to start the **download**.
- Open the .jar file to begin the installation process. Accept the default values unless you have a specific reason to change them. When you see the screen shown below, type the name of the directory where you want to install TFS in the 'Folder name' field. We recommend installing TFS in a folder called 'RSNA' on a drive with adequate free space for the program and teaching files you will create.



Installing TFS

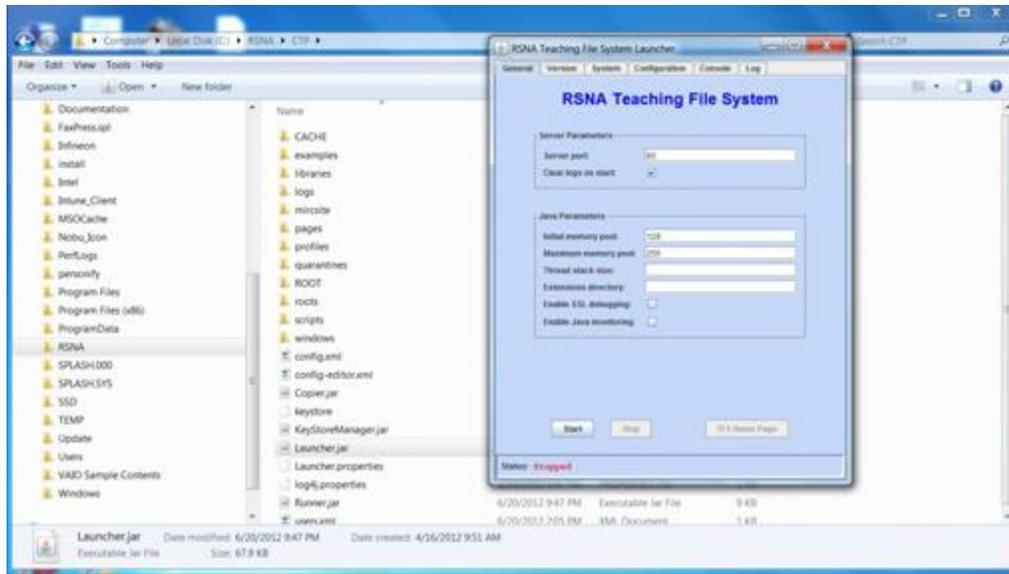
5. You should see a screen confirming that MIRC TFS has been installed.



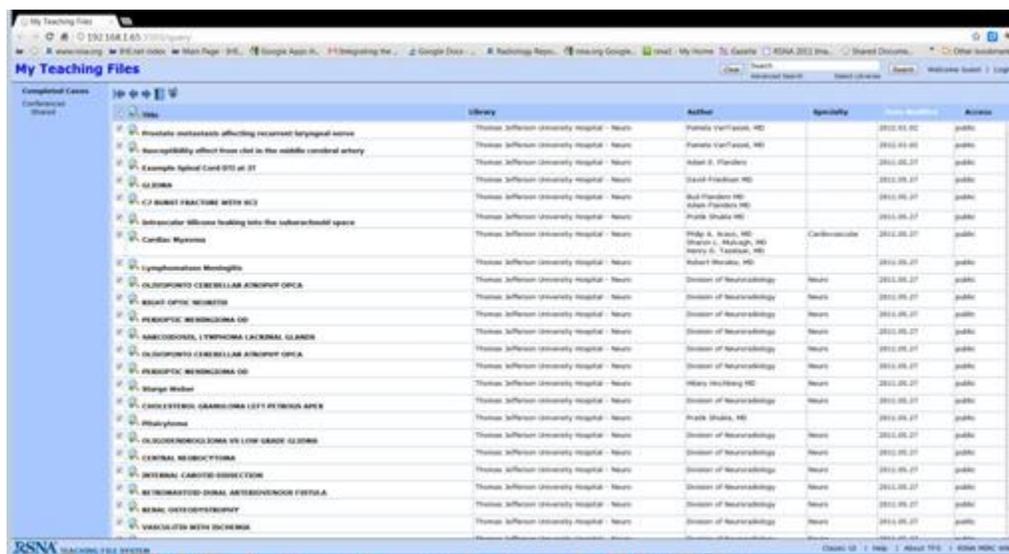
Launch the TFS Site

6. To launch your site, open the directory where you installed MIRC, look in the subfolder named "CTP" and double-click the file named "Launcher.jar". (If the site is on a computer that is regularly shut down and restarted, like a personal TFS site on a laptop, you should right click on the Launcher file, create a shortcut and drag it to your desktop.) In the Launcher window click "Start".

Installing TFS



7. Congratulations! You now have a TFS site running on your computer! After launcher runs, click "TFS Home Page" to view the site in your default browser.



The site is populated with cases published by several public TFS sites. Bookmark it in your browser so you can return there instantly!

Follow the instructions linked below to create user accounts and begin authoring teaching files.

Creating User Accounts

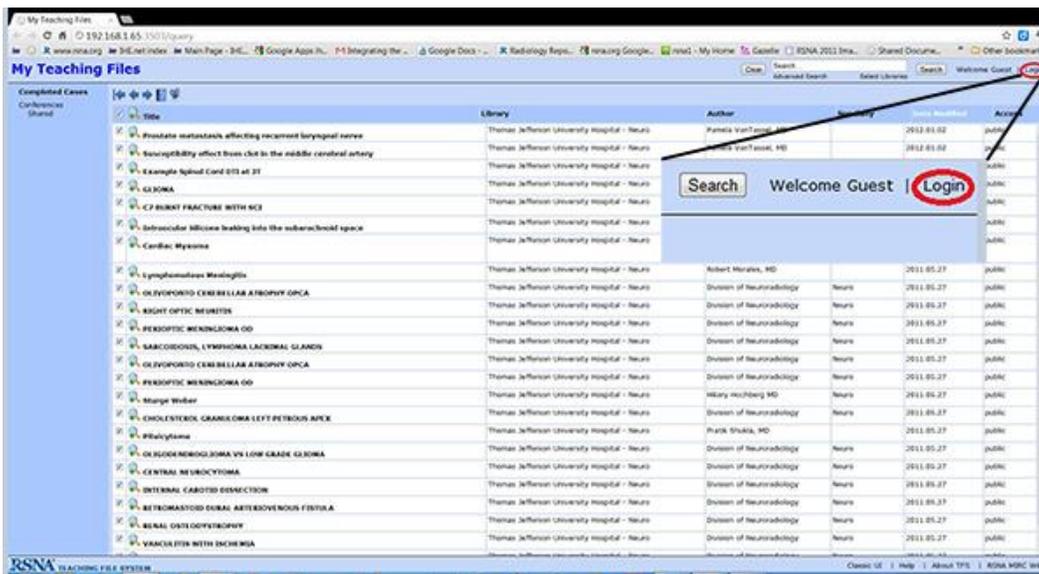


Watch Video Instructions

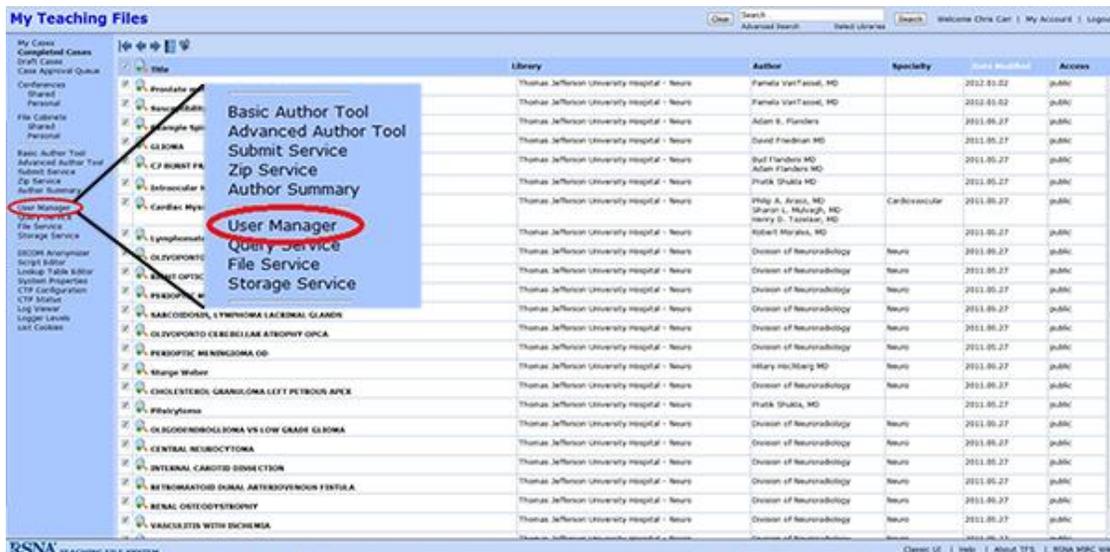
<https://vimeo.com/74464979>

Once your TFS site is installed and running (click here for installation instructions), you will want to create accounts for authors, administrators and other users of the site.

1. On your TFS home page, click "Login" at upper right.



2. A new TFS site has one administrative user account with username "admin" and password "password." Log in to this account. A menu of administrative controls will appear in the blue column at the left side of the page. Select "User Manager" from this menu.



Creating User Accounts

3. On the User Manager page, you can create accounts by entering usernames and passwords and selecting the user privileges to assign to each user. (User privileges are explained below.) The plus (+) button allows you to enter supplemental information (name, institution, contact) for a user. The **X** button deletes a user account. Save whatever changes you make by clicking the save icon. 



4. The down arrow at right allows you to download a spreadsheet (.csv) file of all users in the system. The up arrow allows you to upload a spreadsheet of users into the system (following the same format as a downloaded file).
5. Users can change their passwords and supplemental information by logging in and clicking the "My Account" link at the upper right of the TFS main page.
6. You can use an existing LDAP service to authenticate users of a TFS site Instructions on configuring this option are available [here](#).

Creating User Accounts

TFS User Roles

By default a new TFS site offers the following user roles:

<i>adm</i> (admin)	Can perform any administrative and configuration function on a TFS site, except shutdown of service.
<i>aut</i> (author)	Can create and edit documents on any library (storage service) on the TFS site that allows authoring. By default a new TFS site has one library, with authoring enable.
<i>del</i> (delete)	Allows users of a Clinical Trials Processor (CTP) file storage service or TFS site to delete files. Not generally granted to TFS users.
<i>dep</i> (department)	Adds the user to the "department" group. Authors can grant this group access privileges to documents they are creating.
<i>pub</i> (publisher)	Can make a document public, that is, accessible to all users of the site, whether logged in or not.
<i>shu</i> (shutdown)	Allows user to shut down the MIRC (CTP or TFS) service from within their browser. Normally assigned only under special circumstances for large clinical trials.
<i>upd</i> (update):	Allows user to upload a file (eg, TFS-installer.jar) to the Downloads page of a TFS site. Normally only used by administrators of sites that distribute software. (This capability is disabled by default for new TFS sites.)

Other MIRC Roles

By clicking the "Show All Roles" button, you can select the following roles. These roles are used by the Clinical Trials Processor functions of MIRC and are generally not relevant to TFS users.

<i>gue</i> (guest)	Grants users access to file stored in a CTP file storage service.
<i>imp</i> (import)	Allows users of CTP sites to establish credentials for other sites communicating data to them.
<i>pro</i> (proxy)	Allows users of CTP sites to grant guest status to another user to enable them to view a designated users images.
<i>qad</i> (quarantine admin)	Allows user to access quarantined objects in a CTP pipeline.
<i>rea</i> (read)	Allows user to view images they have added to a CTP storage service.

You can learn more about setting up and running a TFS site by reading articles on the [MIRC wiki site](#) or by viewing the brief video tutorial below.



Watch Video Instructions for Converting an Existing File

<https://vimeo.com/74465146>

Searching for Teaching Files



Watch Video Instructions

<https://vimeo.com/74465147>

MIRC TFS makes it easy to search for teaching files stored on your site and other MIRC sites that are linked to yours.

In its default view, the main TFS query page provides a list of all available completed teaching files, with the most recently modified listed first. If you are logged in, you will also see links for cases you have created (“My Cases”) as well as Draft Cases you have access to and your Case Approval Queue (see Authoring Teaching Files with TFS>Getting Images into TFS>[Patient-centric workflow](#)). You will also have access to your lists of personal and shared conferences and file cabinets.

Use the Search box and button in the upper right margin of your site’s main page to enter search terms and perform searches.

TFS Search Box

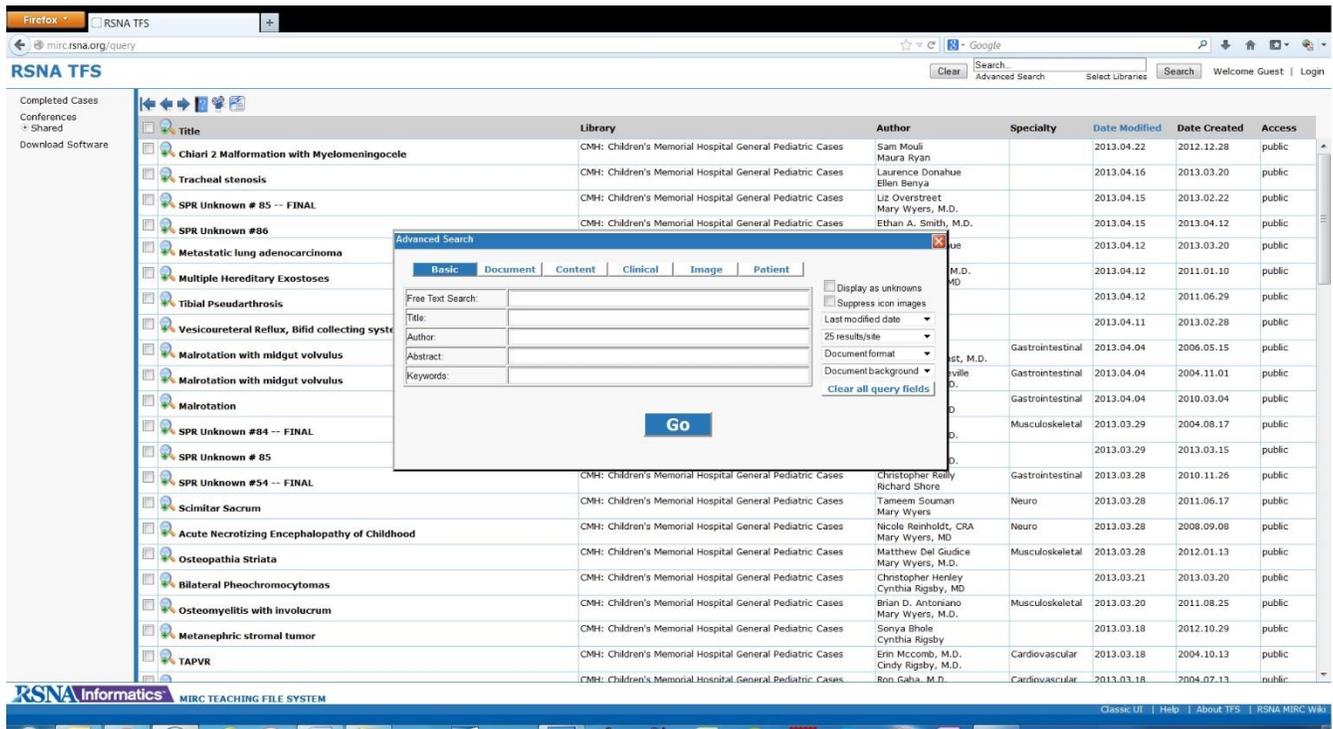
Title	Library	Author	Speciality	Date Modified	Date Created	Access
SPR Unknown #92 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Rekha Mody, MD Maura Ryan, MD		2013.02.20	2009.08.20	public
SPR Unknown #83	CMH: Children's Memorial Hospital General Pediatric Cases	Thomas Gast, M.D. Mary Wyers, M.D.		2013.02.20	2013.02.12	public
Adrenal cortical neoplasm	CMH: Children's Memorial Hospital General Pediatric Cases	Migens Burnad, MD Jack Norman, MD		2013.02.12	2010.04.01	public
SPR Unknown # 74 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Tejal Patel, MD Tamar Ben-Ami, MD	Genitourinary	2013.02.12	2006.07.06	public
Mucopolysaccharidosis	CMH: Children's Memorial Hospital General Pediatric Cases	Esther Ro /Dr. Saker		2013.02.12	2012.01.09	public
Hypertrophic Cardiomyopathy	CMH: Children's Memorial Hospital General Pediatric Cases	Arie Musabji, M.D. Cynthia Rigby, M.D.	Cardiovascular	2013.02.12	2005.12.13	public
SPR Unknown # 81 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Kim Dannull, M.D.		2013.02.02	2013.01.04	public
SPR Unknown #82	CMH: Children's Memorial Hospital General Pediatric Cases	Rekha Mody, M.D. Maura Ryan, M.D.		2013.02.02	2013.01.30	public
SPR Unknown # 81	CMH: Children's Memorial Hospital General Pediatric Cases	Kim Dannull, M.D.		2013.01.08	2013.01.04	public
SPR Unknown #80 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Dan Musick, M.D. Mary Wyers, MD		2013.01.08	2011.01.14	public
Acute appendicitis in 2 brothers	CMH: Children's Memorial Hospital General Pediatric Cases	Jordan Tasse, M.D. Richard Shore, MD	Gastrointestinal	2013.01.03	2010.12.08	public
Postsurgical bladder perforation	CMH: Children's Memorial Hospital General Pediatric Cases	Dan Jeong M.D. Dr. Richard Shore		2013.01.03	2011.03.03	public
Duodenal Atresia	CMH: Children's Memorial Hospital General Pediatric Cases	Rupesh Kalthia M.D. Richard Shore, M.D.		2013.01.03	2011.03.10	public
SPR Unknown #80	CMH: Children's Memorial Hospital General Pediatric Cases	Mary Wyers, M.D.		2012.12.15	2012.12.11	public
SPR Unknown # 79 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Mary Wyers, M.D.	Gastrointestinal	2012.12.15	2012.12.07	public
Tethered Cord.	CMH: Children's Memorial Hospital General Pediatric Cases	Michael Rozenfeld, DO. Maura Ryan, MD.	Neuro	2012.12.10	2012.12.05	public
RSNA 2012 MIRC Presentations	RSNA MIRC Library	John Perry		2012.11.22	2010.11.22	public
SPR Unknown # 78 -- FINAL	CMH: Children's Memorial Hospital General Pediatric Cases	Esben Vogelius, M.D.		2012.11.20	2012.10.26	public
SPR Unknown #79	CMH: Children's Memorial Hospital General Pediatric Cases	Mary Wyers, M.D.		2012.11.20	2012.11.20	public
Congenital Central Hypoventilation Syndrome with associated Neuroblastoma.	CMH: Children's Memorial Hospital General Pediatric Cases	Erin Happ Francis Prendergast	Pulmonary	2012.11.20	2011.03.29	public
Mecconium Ileus	CMH: Children's Memorial Hospital General Pediatric Cases	Vishal Khastari Francis Prendergast, MD		2012.11.20	2011.05.03	public
Test of pixel anonymizer	RSNA MIRC Library	Krishna Juluru		2012.11.19	2012.08.16	public
	CMH: Children's Memorial Hospital General Pediatric Cases	Sarah Deitch	Musculoskeletal	2012.11.16	2010.09.08	public

The basic TFS search is a free-text search that finds cases containing the search term anywhere in their content. Searches only find cases you are allowed to access (so, again, you should log in before performing a search).

You can search on more specific criteria using the Advanced Search. Click the link beneath the Search box and the Advanced Search window will appear.

Searching for Teaching Files

TFS Advanced Search Window



In the Advanced Search Window you can request cases that have search terms in specific sections of a teaching file and search by title, author and keywords. You can also control the way search results are organized and presented.

Finally, if your site has access to more than one MIRC TFS library, you can limit the scope of your search to a selection of one or more of those libraries.

Creating a Teaching Conference



Watch Video Instructions

<https://vimeo.com/74465148>

You can use MIRC TFS to combine teaching file cases into conferences and to present the cases in a way especially suited to conferences.

Create a New Conference

To set up a conference, first log into your MIRC site. You will see links for Shared and Personal conferences in the left hand control bar: select which kind of conference you wish to create. Shared conferences will be available for other logged in users of your site. They will be able to view only cases they have permission to see.

Create a new conference using the control that appears in the body of the page (or by clicking on the word Conferences in the control bar).

Create New Conference control

Type the name of the conference and click ok.

The conference should now appear under the Personal Conferences

Add Documents to a Conference

To add teaching cases to your conference, go to the TFS home page and select from the available files. Use preview mode to see thumbnail versions of the images in a case.

Preview Mode

Select a case you want to add to the conference and open it (by clicking on the title). Click on the Document tab and you will find a button to Add to Conference (along with several editing and export options).

Add to Conference button

(Note that if you don't see these controls, you probably don't have permission to use the case.)

Select your conference from the list of available conferences in the window that pops up.

Run a Conference

When you have added all the cases you want in your conference, and it comes time to present it, TFS allows you to show it in a seamless way optimized for teaching. Select the conference you want to run from the left-hand control bar. Then click the movie projector icon to launch the Case Navigator.

TFS provides simple controls to let you present the cases in order, showing only the images and skipping over any explanatory text sections.

Exporting Cases form TFS

Exporting Cases from TFS

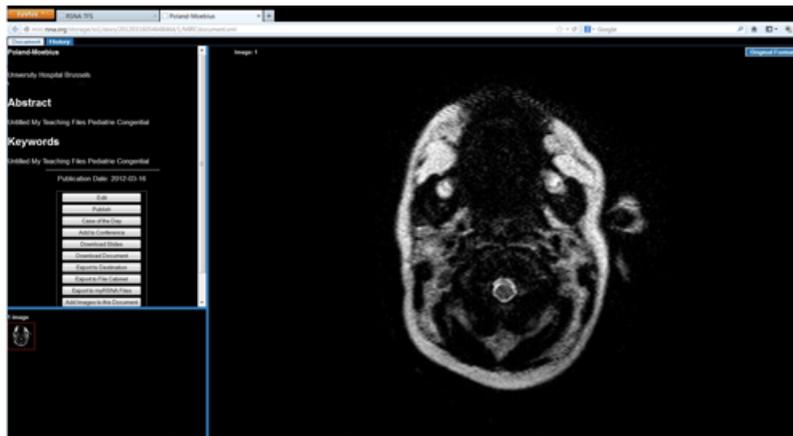
MIRC TFS is designed to give you flexibility in maintaining and moving the cases you create. It allows you to export cases from your TFS site:

- as zip files that can be imported to another TFS site
- as presentation files that can be opened and edited in MS-PowerPoint

To export cases, you must be a logged into the TFS site you are using, with permissions to export the desired cases.

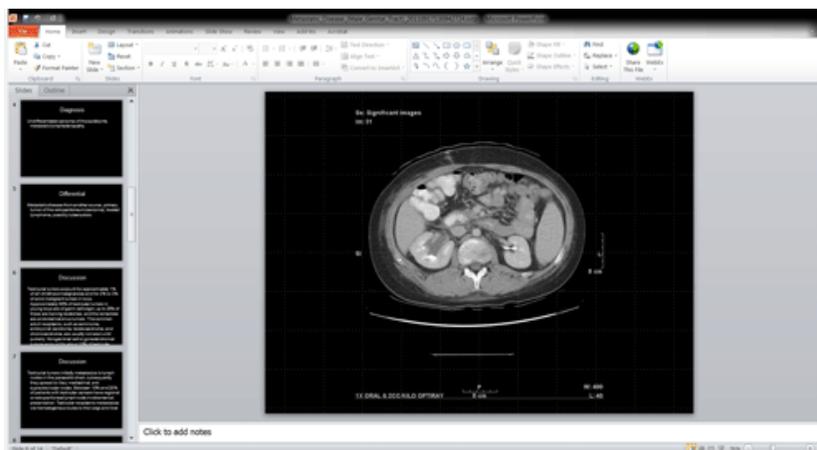
Download as a .zip File

To download a single case you are viewing, click on the **Document** tab and click the **Download Document** button. The case will be exported as a .zip file you can save to a local hard drive and upload to another TFS site using the Submit Service on the main TFS page.



Download as MS-Powerpoint-compatible Presentation Slides

To download the case as a set of presentation slides, click the **Download Slides** button. The case is exported in the Open Office presentation format (.odp), which can be opened and edited with presentation software including MS-Powerpoint (version 2010 and later).



Basic Authoring



Watch Video Instructions

<https://vimeo.com/74465145>

MIRC TFS is designed to make authoring teaching file cases (and other imaging-focused educational materials) fast and convenient. The files you create can be as simple or elaborate as appropriate for their intended use. The instructions below cover the basic steps in the authoring process, while suggesting some of the flexibility possible in using TFS.

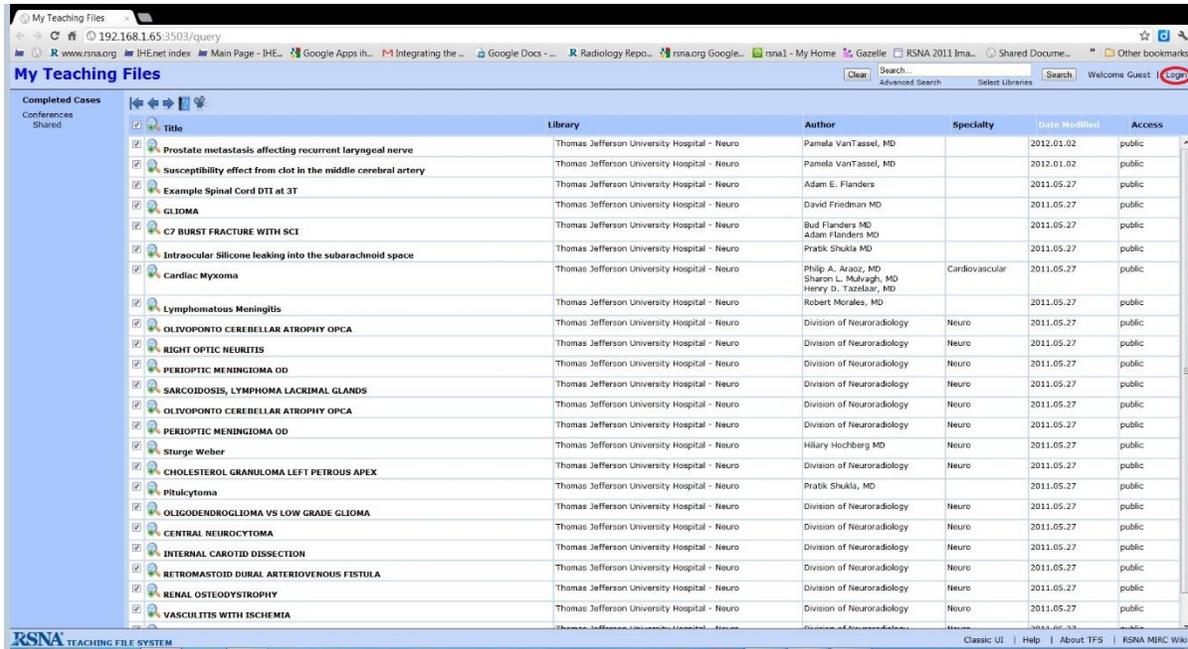
Instructions for Authoring Teaching Files

- [Launching the TFS Authoring Tool](#)
- [Using the TFS Basic Author Tool](#)
- [Sharing a Case](#)
- [Editing a Case](#)
- [Using the TFS Advanced Author Tool](#)
- [File Cabinet](#)
- [Getting Images into TFS](#)
 - [Patient-centric Workflow](#)
 - [Using IHE TCE](#)
 - [Using Images Saved to a Shared Drive or Removable Media](#)

Basic Authoring

Launching the TFS Authoring Tool

To author your first case, log in to your account on your TFS site (click here for information on creating TFS user accounts).



Once you are logged in, you'll see in the menu at left that you can choose between the basic and advanced authoring tools. Start by clicking the link for the Basic Author Tool.



Basic Authoring

Using the TFS Basic Author Tool

Once you've launched the Basic Author Tool, you'll see that it presents the outline of a teaching file case defined by an authoring template. By default, the template presented is the Basic Author Service Template, which includes a title, author information and a set of five sections with defined headings (Abstract, History, Findings, Diagnosis, Discussion).

The screenshot displays the 'Basic Author Service' web interface. At the top, there's a navigation bar with 'Clear', 'Search...', 'Advanced Search', 'Select Libraries', and 'Search'. Below this, the main content area is titled 'Basic Author Service'. It contains a form with the following sections:

- Template:** A dropdown menu showing 'Example Basic Author Service Template'.
- Compose a title - consider a short phrase that includes the history or diagnosis:** A text input field containing 'Example Basic Author Service Template'.
- Add author and document owner information:** A table with the following entries:

Author's name:	Dr. Expert Radiologist
Author's affiliation:	Expert Radiology Practice
Author's phone or email:	informatics@rsna.org
Document owner's username:	EvRad
- Enter any desired content:** Five text input areas with labels: Abstract, History, Findings, Diagnosis, and Discussion.

The footer of the page includes the RSNA logo and the text 'TEACHING FILE SYSTEM', along with links for 'Classic UI', 'Help', 'About TFS', and 'RSNA MIRC Wiki'.

A site administrator can change the templates presented in the Basic Author Tool. [Refer to this article on the MIRC Wiki for instructions.](#)

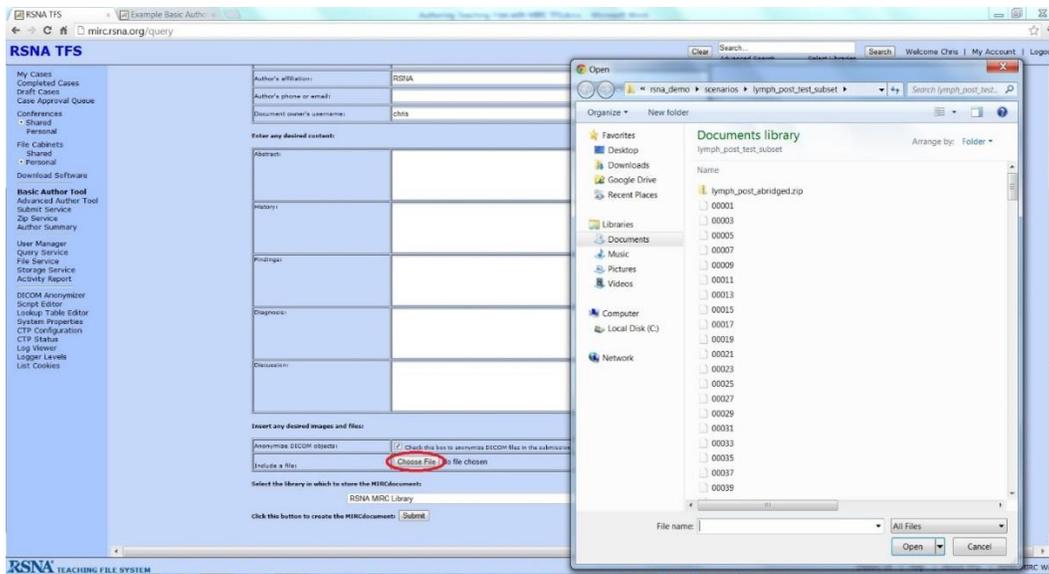
The default initial title of a new case is the same as the template name. Change it to something that reflects the real subject so users can find the case once you have a fully developed library of cases).

Information you enter under "Add author and document owner information" will be used for the case you are currently authoring and as the default information for cases you author in future when logged into the site. (You can update the author information for your account by clicking on My Account at upper right.)

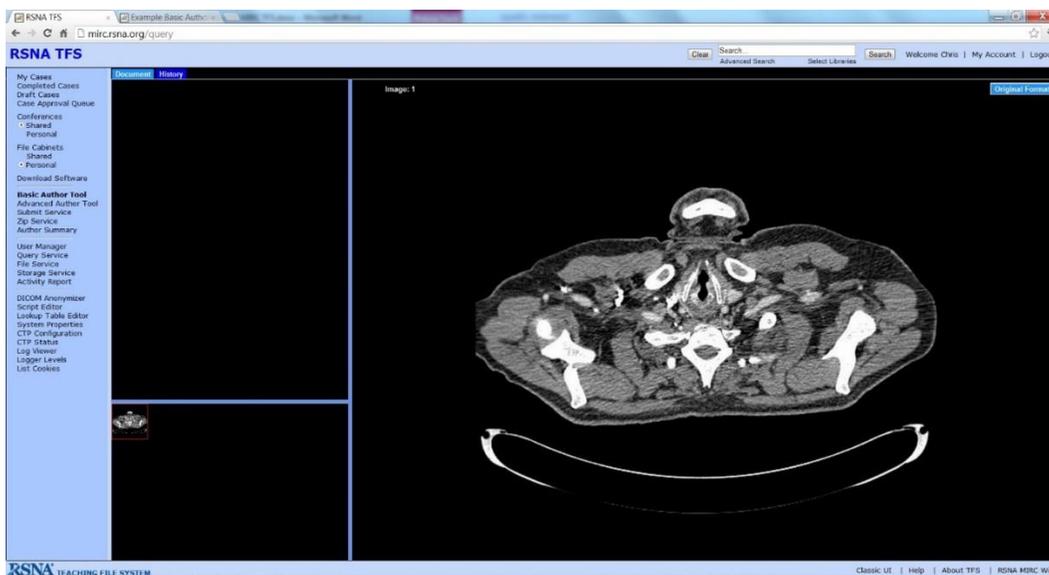
You can add as much text as you like to each section of the template and leave any section empty if you wish.

To add images to the case, click the Choose File button near the bottom of the page. You can browse to any images accessible to the computer you are using. (See below for instructions on getting images from a PACS into the authoring environment.) Repeat for each image you want to add. Note that TFS supports several common image formats, including jpegs and most kinds of DICOM images.

Basic Authoring



Once you have selected as many images as you want to include in this case, click the Submit button at the bottom of the page. TFS will launch the case you have been authoring. If you are using the Basic Author Service Template, it will look something like this:



The sections you populated with text appear as tabs in the upper left pane and, by default, the file opens to the first in the sequence. Any sections you left blank will be missing. Note that the Document tab includes information about the case (including author, title and abstract) and controls you can use to share, edit and manage it.

The images you added to the case appear in the large right pane, in the sequence in which you added them. The controls at the top of the image pane let you flip through the images. Thumbnail "scout" images appear in the lower left pane.

You've mastered creating a new case with the basic authoring tool! Now on to sharing, editing and managing cases in your library ...

Basic Authoring

Sharing a Case

When you create a new case, by default it is private—meaning only you can access it. By clicking the Publish button on the Document tab, you make it viewable by all users of your site.

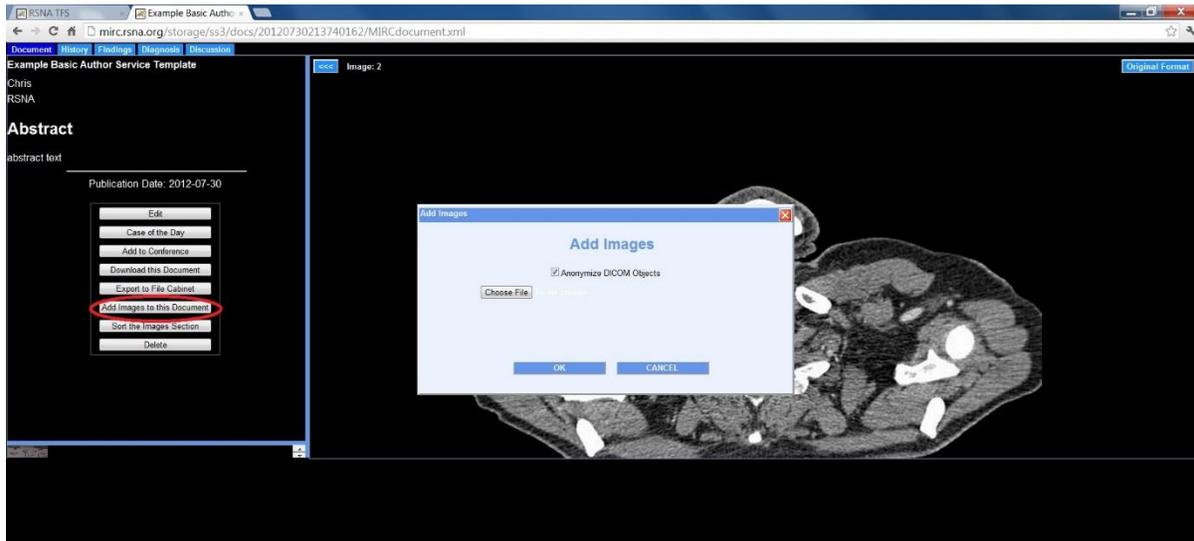


You can set more specific access controls by using the Advanced Author Tool (see below). You can also create Conferences, which allow you to share a designated set of files with a group of TFS site users (see instructions for [How to Set Up and Run Conferences](#)).

Basic Authoring

Editing a Case

You can make changes to a case (assuming you are logged in and have privileges to edit the case) using the controls on the Document tab. Clicking the Edit button will launch the Advanced Author Tool (see below). If you just want to add images to a case or sort the images in the case, there are buttons to launch simple pop-up screens to handle those functions.



You can make more extensive changes to the text, images or other attributes of an existing case by using the Advanced Author Tool.

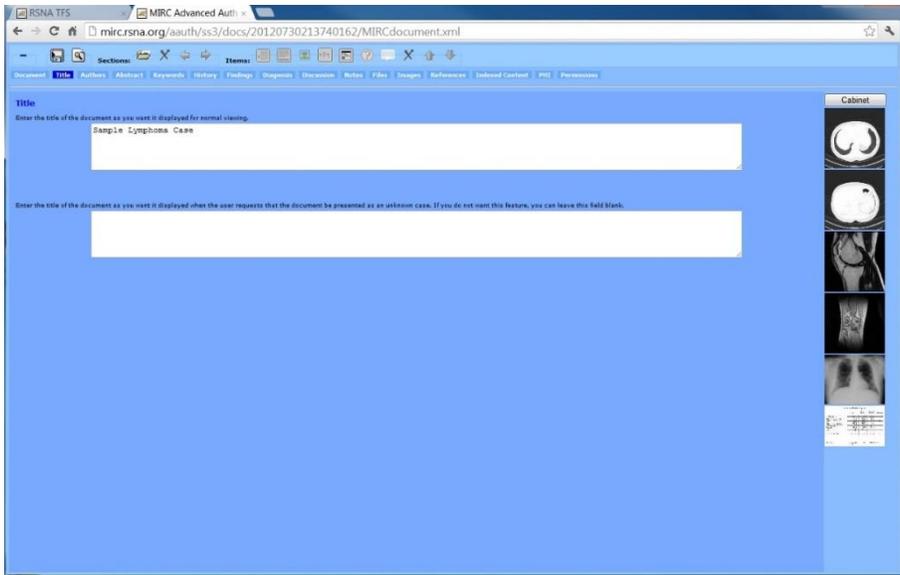
Basic Authoring

Using the TFS Advanced Author Tool

When you are logged in to TFS you will see an Edit button the Document tab of any case you have privileges to modify.



Clicking the Edit button will launch the Advanced Author Tool. It provides a wealth of functions to add, modify or delete section tabs, text and images.



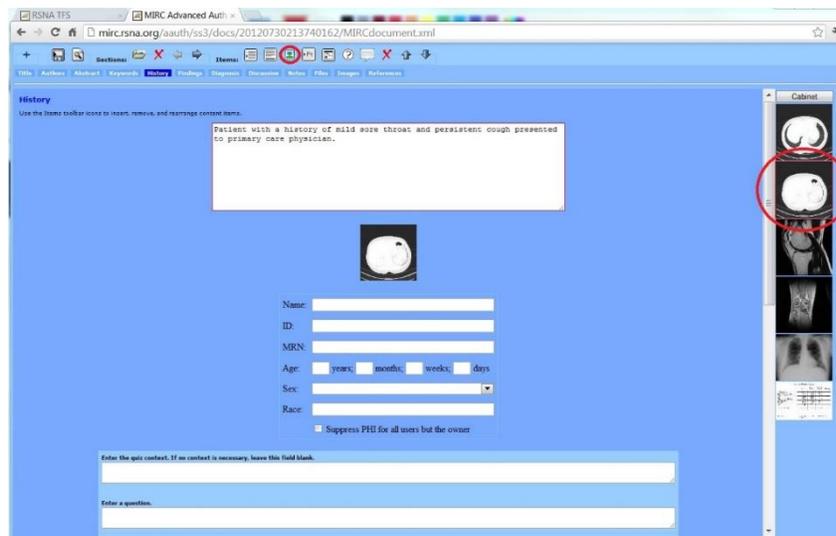
The section tab names available in the case you are editing are shown in a row of labeled boxes. Click on any one to add or modify text and add or remove images. There are special tabs where you can place Indexed Content, which TFS will use in searching for documents but won't display to other users, and PHI, patient-identifying information that will be visible only to the author.

The row of icons at the top of the window lets you add, delete or change the sequence of sections, paragraph text blocks, images, captions, patient information blocks, links to external Web pages, quiz questions and comments.

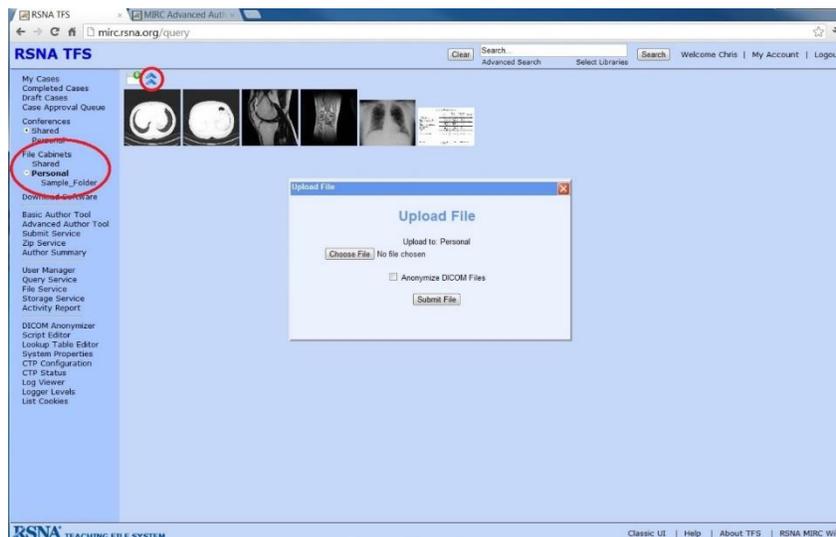
Basic Authoring

File Cabinet

File Cabinet provides the palette of images you can use in creating and editing a case in the Advanced Author Tool. To add an image to any section, click to select the image in the File Cabinet (it shows a red frame when selected) and click the add images button in the toolbar (the one with the green icon).



To load images into your File Cabinet, navigate to it from the main TFS window. When you are logged in, a link to the File Cabinet appears in the left navigation bar. Note that on some sites you may have a choice of more than one File Cabinet to use. There are two file cabinets on most TFS sites: Personal and Shared. Images added to your personal file cabinet can only be viewed by you, while images added to the shared file cabinet are visible to other TFS users. Click the link to open the desired one.



The Add Folder button helps you organize the images in your File Cabinet.

Click the double up arrow to browse for and upload images. Choose the file you would like to add to the file cabinet by clicking on the "Choose File" button and selecting the file from your computer. Then click "Submit File" to add it to the file cabinet.

Basic Authoring

Getting Images into TFS

TFS supports a few different methods for moving images from the PACS workstation, where radiologists typically view them, into TFS so they are available in the authoring tool.

Patient-centric Workflow

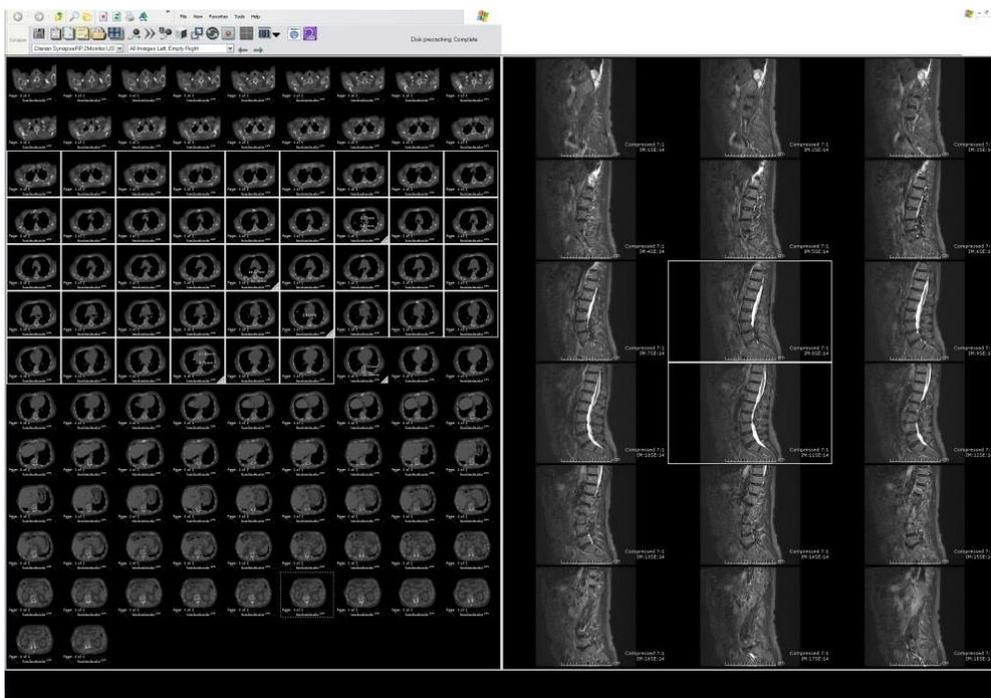
TFS can act as a DICOM receiver (SCP) so you can configure your PACS to send images directly to it. While the precise functionality varies from PACS to PACS, most current systems can be configured to send to alternate destinations. If you set up your TFS site as a destination, you can push image studies directly to it. While some PACS only allow you to send complete studies, others can be configured to send selected images (see, for example this [MIRC Wiki article on configuring GE Centricity PACS to send selected images](#)).

When you send images from PACS to TFS, they initially go into a case queue that only the logged in users of the site can see. While in that queue, the images retain patient identifying information so the author can find them. Multiple studies sent to TFS for a single patient will all be added to the same case. TFS even uses study acquisition date information from DICOM images to establish the time relationship of a patient's multiple studies. The initial study is set as the baseline and subsequent studies indicate how much later they were acquired (eg, "65 days later").

Once the author opens the case, edits and saves it, patient information is removed and the case is moved from the case queue to the author's cases (and shared with whomever the author selects).

Using IHE TCE

Some PACS systems—notably Fuji Synapse and Candelis—can connect to TFS using a standard set of DICOM protocols specified in the [IHE Teaching File and Clinical Trial Export \(TCE\) profile](#). This method allows you to specify key images from a study to include in a case and to add supplemental information at the time of export to make it easier to find the images and author the case. The example below is based on Fuji Synapse's implementation of TCE.



At your workstation, open one or more studies that you would like to use to create a teaching file. You can select entire studies or individual images within studies. To select individual images, go to the Overview tile format (Right-click › Tile Formats › Overview) and click on the desired images. Selected images display surrounded by a white box.

Basic Authoring

Using Images Saved to a Shared Drive or Removable Media

If there is no way to connect directly to a TFS site from their workstations, many radiologists save images for teaching files or presentations to removable media (such as a "thumb drive" or CD) and physically transfer them to a system where they can access TFS. This approach is inconvenient, hard to manage and prone to loss or exposure of information. However, if you are unable to persuade your IT administrator to connect to a TFS site via Patient-Centric Workflow or TCE, you can author cases using images stored on your local computer (or any accessible drive) using either the basic or advanced author tools as described above.

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Resources

- [MIRC Wiki Articles](#) on Installing, Configuring and Running a TFS Site
- [Download the latest version of TFS](#)
- [See how Lurie Children's Hospital of Chicago is using TFS](#)
- [Read MIRC User Stories in RSNA News](#)
- [Browse the RSNA MIRC TFS Site](#)
- [Get the Details on TFS Security and Features](#)
- Join the [MIRC User Forum](#) to post questions and provide feedback



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