Sharing in this manner through the Bonjour protocol, should be restricted to firewall protected local area networks. Confidential patient data is at risk if databases are shared on the open internet where unauthorized users may capture the data. It is your responsibility as the user to ensure all transferred data is secure and within a controlled network with appropriate password protection and data access management.

To share your database go to the *Horos* contextual menu and select *Preferences* (Fig 9.18a). This will bring up the *Preferences* menu window, here you select *Listener* (Fig 9.18b).

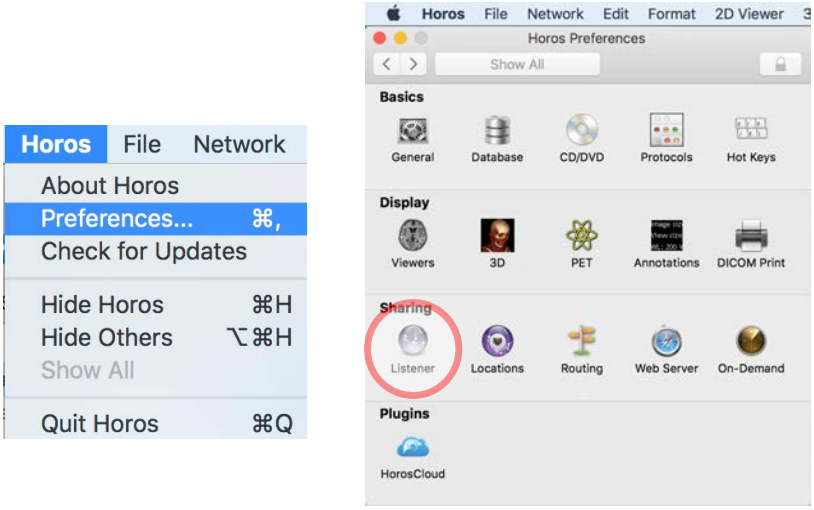


Figure 9.18 The *Horos* contextual menu with *Preferences* highlighted (a), and the *Listener* option in the *Preferences* window (b)

Within the *Horos Preferences:Listener* window, select 'Activate Horos database sharing, and publish it using the name: xxx'. This can be found within the *Other options* section at the bottom of the window (Fig 9.19). You can choose to password protect the database by entering your chosen password in a box which appears when you select the database sharing option.

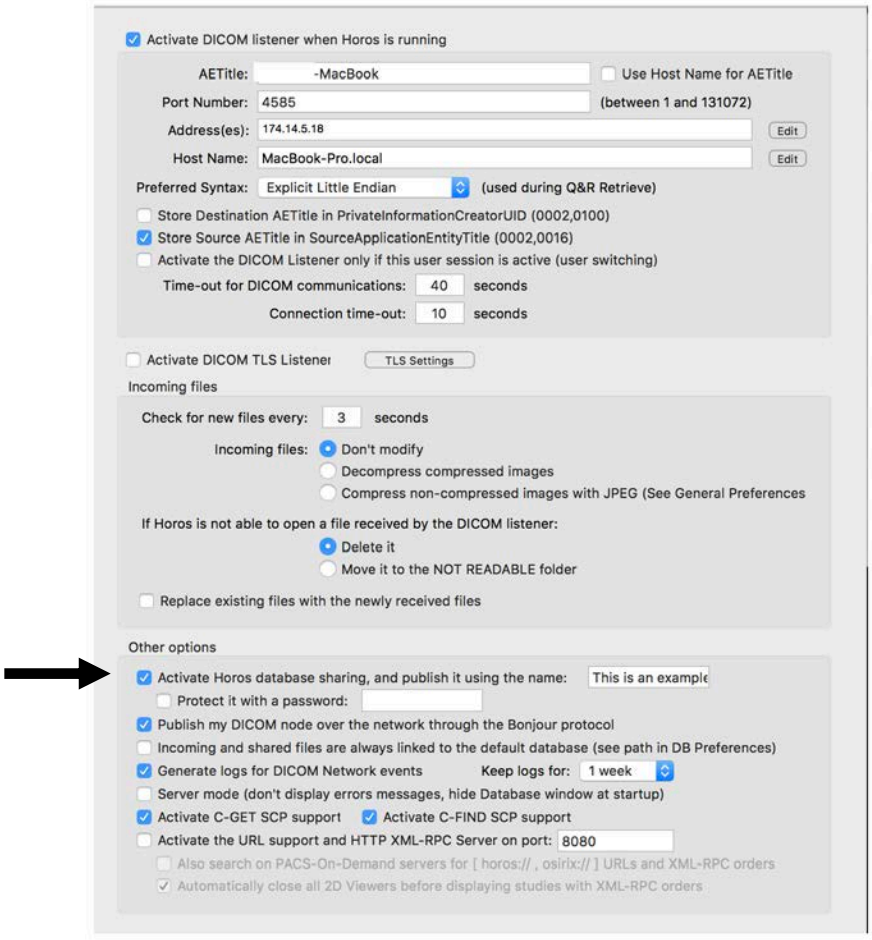


Figure 9.19 The *Horos Preferences: Listener window.* 'Activate Horos database sharing and publish it using the name xxx' is highlighted.

Once you have activated database sharing, it immediately becomes visible to local network users. Remote users can also access the database if they know your IP address. Your workstation name will appear on the list of shared resources, see Chapter 3 for more information.

When a database is shared, the user wishing to access the database first selects the desired database from the *Sources* list in the left hand side panel of the database window. Double clicking on the named database opens the study list allowing the user to browse and view images from the remote database, just as they would if were their local database. This provides much faster access than searching for and importing images from one workstation to another.

Network Logs

Communications between Horos and other workstations or a PACS can be logged. To do this go to the *Horos* contextual menu and select *Preferences* (Fig 9.20a). This will bring up the

Preferences menu window, here you select the *Listener* icon (Fig 9.20b). For more information on this see Chapter 2.

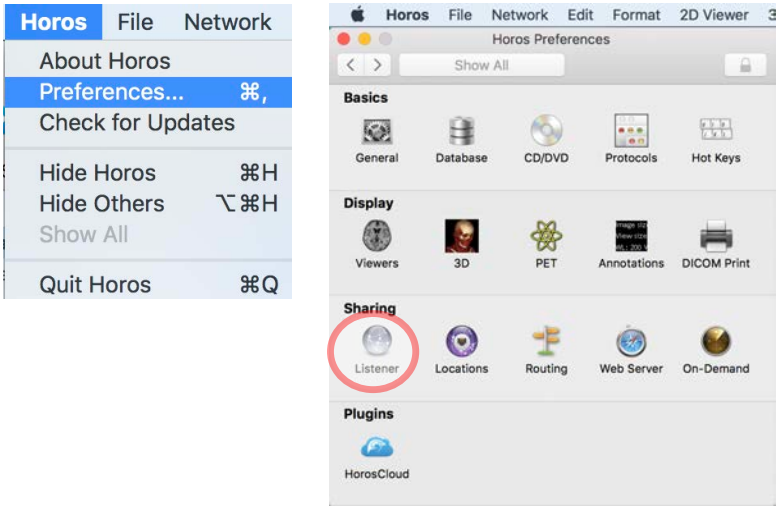


Figure 9.20 The *Horos* contextual menu with *Preferences* highlighted (a), and the *Listener* option in the *Preferences* window (b)

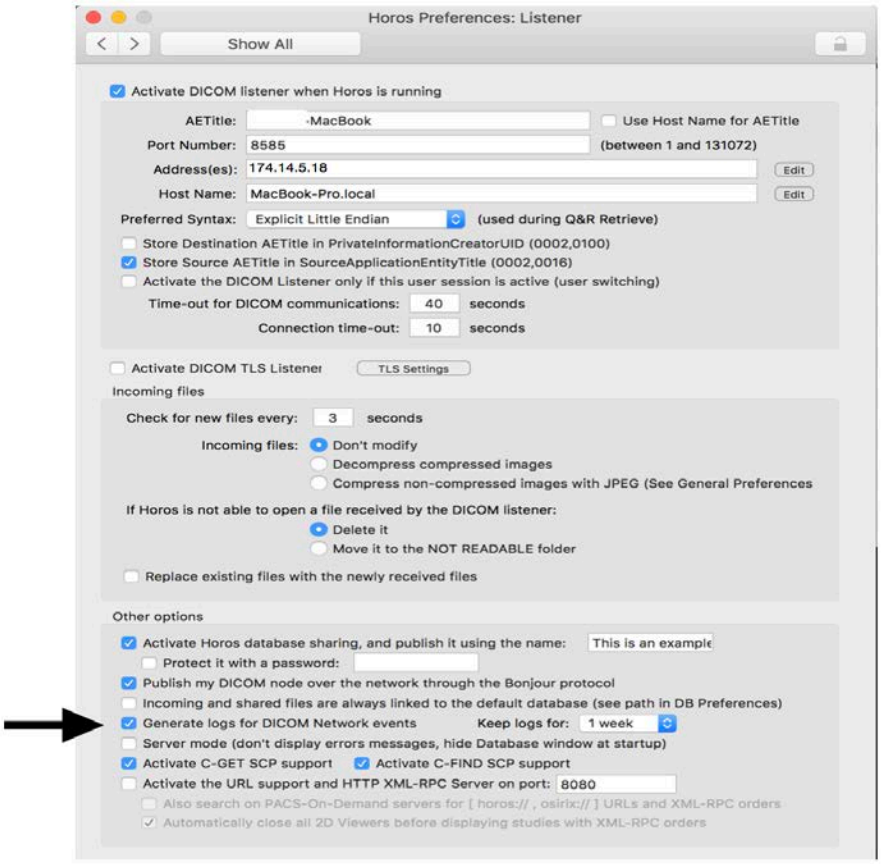
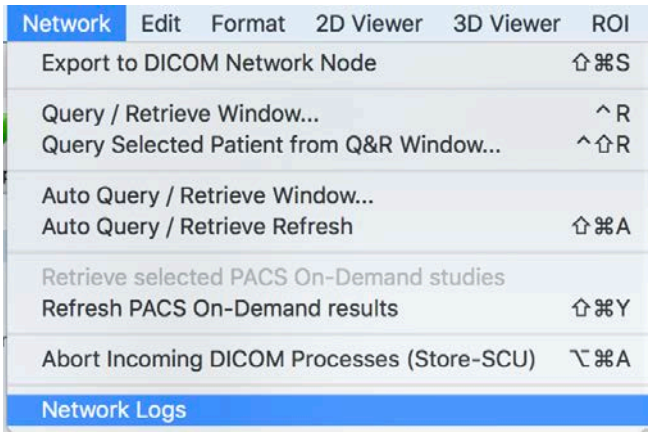


Figure 9.21 The Horos Preferences: Listener window. 'Generate logs for DICOM Network events' is highlighted.

Network logs are specific to each database and are stored ins the *database.sql* file. Logs are stored for a defined period of time, the default period being 1 week. This can be amended in *Horos Preferences:Listener.*



When you load the database, the logs are also loaded. A new set of logs will be started when a new database is created. Conversely, if the database is deleted the logs are also deleted.

To view the Network logs go to the *Network* contextual menu and select *Network Logs* (Fig 9.22).

Figure 9.22 The Network contextual menu, Network Logs is highlighted

The window is divided into 4 tabs: Retrieve, Send, Move and Web Server. Each of these tabs display the Network logs for their respective DICOM services.

HTTP Web Server

When activated, Horos can display the database contents on HTML pages allowing you to share data using a simple web browser. Horos contains a Web Server module which allows images to be easily shared with any user, even those with computers not running DICOM-compatible software. This feature can also be used to overcome firewall issues.

The contents of a Horos database can be accessed by an end-user via a simple web browser. To do this the user:

- Enters the web address of the Horos Web Server
- Completes the login screen (anonymous or authenticated), see Chapter 4 for more details
- Once redirected to the main screen, searches the database
- Receives a display list of matching studies
- Can display the contents of selected studies

To activate or deactivate this function go to the *Horos* contextual menu and select *Preferences* (Fig 9.23a). This will bring up the *Preferences* menu window, here you select the *WebServer* icon (Fig 9.23b). In the Horos Preferences: Web Server window, select '*Activate the built-in Web Server'* (Fig 9.24).

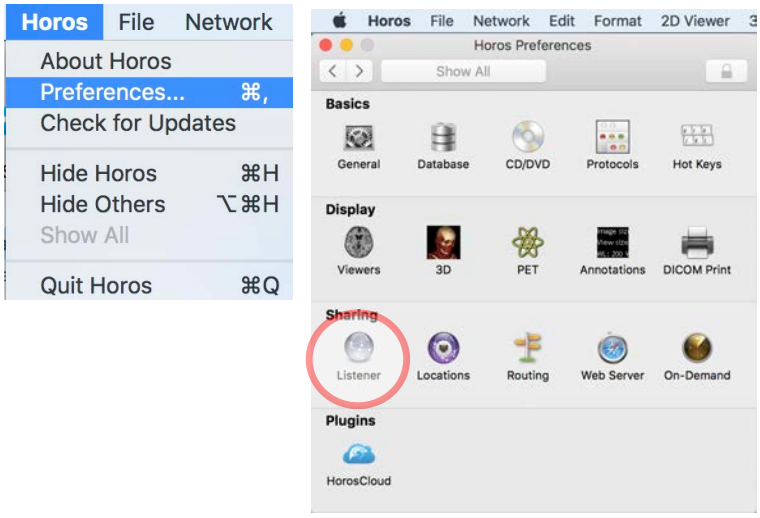


Figure 9.23 The *Horos* contextual menu with *Preferences* highlighted (a), and the *Listener* option in the *Preferences* window (b).

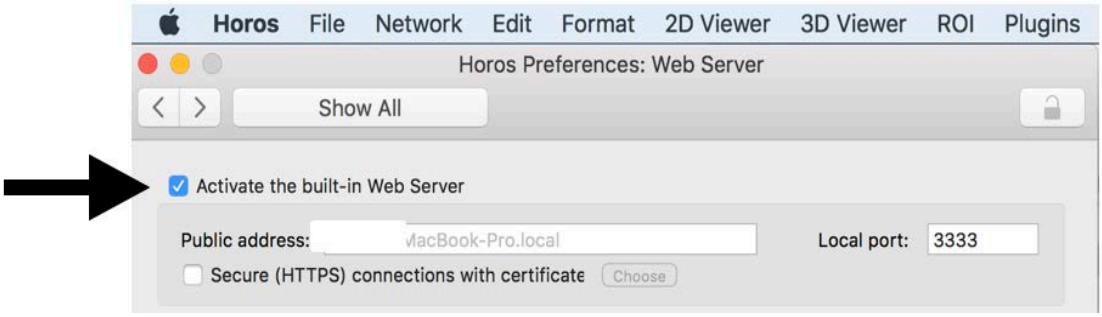


Figure 9.24 The Horos Preferences: Web Server window. 'Activate the built-in Web Server' is highlighted

Other parameters can also be accessed through the *Horos PreferencesWeb Server*, or directly through there Web pages if you have administrator preferences.

The original DICOM files can also be accessed through the Web Server by activating the WADO protocol. For more information on this see Chapter 4

Notifications

Users of the Web Server can choose, by activating the option within *Web Server Preferences,* to receive notifications when a new study is available. No images are sent in the email. Mac OS X Mail application is used, provided this has been correctly configured with a valid email address.

It is possible to manually send notifications to a user by selecting the *Notification* icon from the toolbar. A temporary user can also be created using the *Notifications* icon, allowing them to view selected studies.

More information is available on this in Chapter 2

Security

A number of security options within *Horos Web Server,* ensure data is safely transmitted without compromising patient data. When activating the Web Server on an internet connected computer, security layers should be appropriately activated.

HTTPS: When using HTTPS, all data shared between the Web Server and the browser (client) is encrypted. A combination of the HTTP and the SSL/TLS protocol is used for HTTPS. The server allows secure identification and encryption, using a valid certificate. The client will be informed that the data is encrypted and will know whether the server is trusted or not.

Authentification: The visibility of the server is limited to registered users only, via the authentication methods of the Web Server. See Chapter 4 for more details.

Image Access Restriction: Access to images can be restricted to certain images only, via the authentication system. See Chapter 4 for more details.

Transfer Limitations: Image downloads, uploads and sharing can be limited by the use of the authentication system. See Chapter 4 for more details.

DICOM TLS: DICOM TLS should be used by all DICOM nodes, if transfers are authorized on the Web Server, to ensure encryption of DICOM files. A DICOM node describes any networked DICOM software or hardware, which is used to manage, process or transfer DICOM images. This is essentially a workstation or PACS server. Each DICOM node is uniquely identified by the TCP/IP address of the computer e.g. 174.14.5.18 as well as the TCP/IP Port e.g. 4686 and its Application Entity (AE) title e.g. Horos. Appendix B provides more information.

Events Logging: Logged events are stored in the Network Logs table. This can be accessed from the *Network* contextual menu and selecting *Network Logs*. User logins, image downloads and study views are all logged including the event description, date, study and patient name and TCP/IP address of the user.

Users Management: A simple database can be utilised to manage user authentication, which manages user's identity e.g. name, address and passwords, as well as clearance levels for image transfers.

Users can be restricted to viewing only certain studies via the Web Server (Fig 9.25). Entry of a SQL filter is required to set this restriction e.g. Dr Marie Dole can be given access to view only her patients using the following SQL request:

(*referringPhysician* CONTAIN[cd] 'Marie Dole')

Alternatively the user can be given access to only a custom list of studies, manually managed from Horos. When other users share studies, this list will modify.

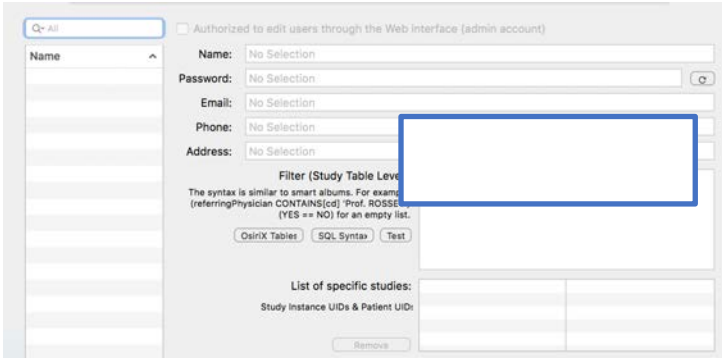


Figure 9.25 The study filter for the Web Server. Restrictions are entered into the highlighted box using a SQL request

A number of customizable options are available for each user. These are illustrated in Figure 9.26.

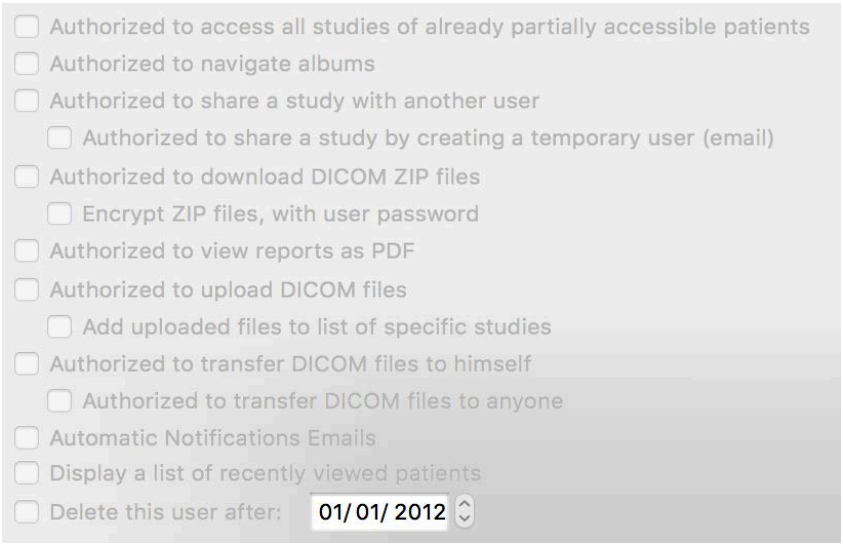


Fig 9.26 Customizable options for individual users of the Web Server

If a user its authorized to transfer DICOM files to himself/anyone, the user will require DICOM compatible software to receive the images. The DICOM C-STORE protocol is used and a DICOM C-STORE SCP will initiate by Horos to the TCP/IP address of the logged in user. For more information on transferring files to a DICOM node, see Chapter 2.

A DICOM node describes any networked DICOM software or hardware, which is used to manage, process or transfer DICOM images. This is essentially a workstation or PACS server. Each DICOM node is uniquely identified by the TCP/IP address of the computer e.g. 174.14.5.18 as well as the TCP/IP Port e.g. 4686 and its Application Entity (AE) title e.g. Horos.

When logged on, users can alter some of their account's settings and change their password, email address, address and phone number. If they wish they can also enable email Notifications. More information on email notifications can be found earlier in this chapter.

Web Pages Customization

The Horos default Web Server display can be customized with specific information or institutional logo. The HTML pages are built according to the user's choices. The HTML template is stored in the following folder: /Library/Application Support/Horos/WebServicesHTML. To use the English pages go to the 'English' folder.

To use a customized layout go to the *Horos* contextual menu and select *Preferences* (Fig 9.27a). This will bring up the *Preferences* menu window, here you select the *WebServer* icon (Fig 9.27b). In the Horos Preferences: Web Server window select 'use templates at…..' (Fig 9.28). The enter the folder name '/Library/Application Support/Horos/WebServicesHTML' into the dialogue box which appears (Fig 9.29).

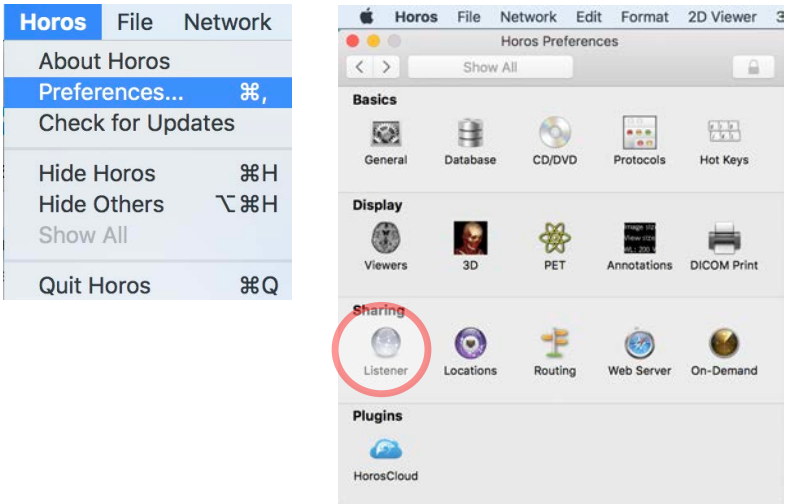


Figure 9.27 The *Horos* contextual menu with *Preferences* highlighted (a), and the *Listener* option in the *Preferences* window (b).

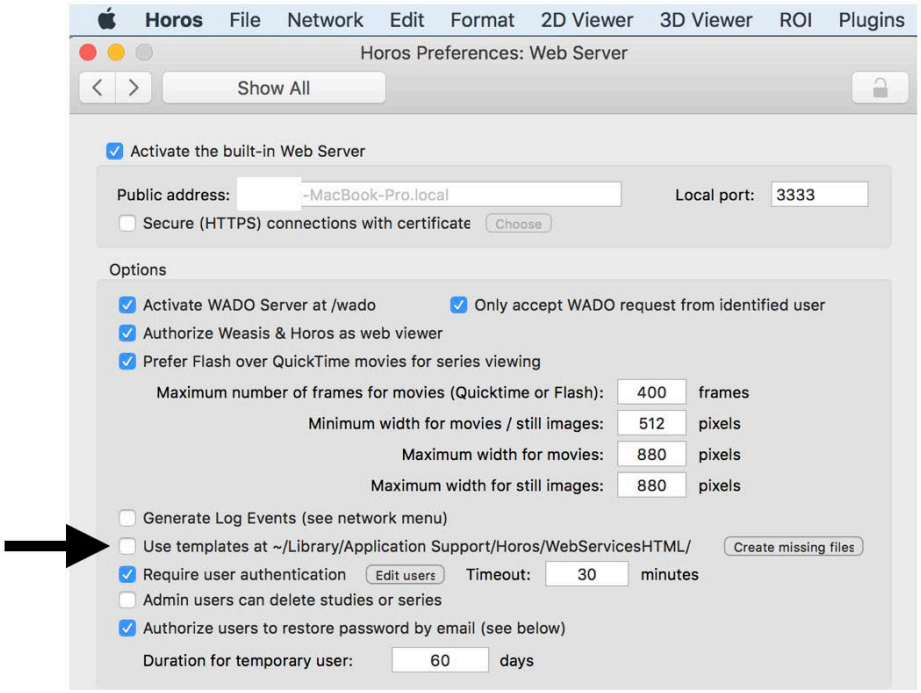


Figure 9.28 The Web Server Preferences window. 'Use templates at … ' is highlighte

The folder is, by default, hidden on MacOS. To locate and open this folder go to *Finder* and select *Go*, followed by *Go to Folder* (Fig 9.29). In the window that appears enter: Library/Application Support/Horos/WebServicesHTML (Fig 9.30). Your workstation will then take you to the hidden Horos folder.

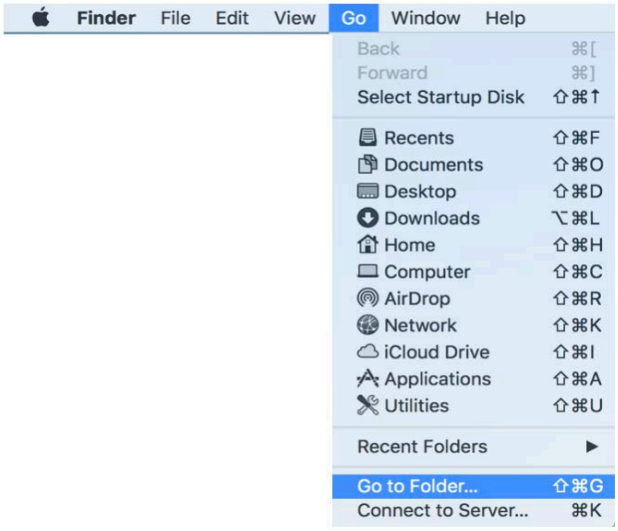


Figure 9.29 The *Finder* contextual menu. Select *Go* and followed by *Go to Folder*

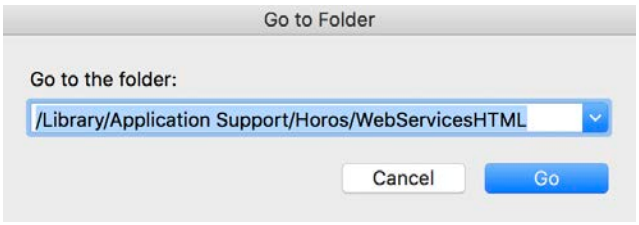


Figure 9.30 Enter the Web Services folder location into the window which appears

The essential components and structure of this folder are:

```
+WebServices HTML
        +English
                +account.html
                +emailTemplate.txt
                +index.html
                +main.html
                +password_forgotten.html
                +series.html
                +study.html
                +studyList.html
```

Other files, sub-directories, images, styles etc can be added and the required files can be modified. Certain folders and textual tokens should be treated with caution e.g. %name%, %AlbumNameURL%. These tokens will be parsed and used by the Web Server as structure markers our replaced by actual values.

It is important to note the these pages are written in script language interpreted by Horos, and nor real HTML.

XML-RPC

Horos is designed as a DICOM viewer, which can be used as a PACS server. It is not however a Radiology Information System (RIS) or Hospital Information System (HIS) which are designed to manage medical images, records and associated data. Horos integrates a HTML server with an XML-RPC protocol to be able to integrate with applications which can assist with data migrations.

If installed, RIS or HIS software can be useful to move information from or to another application such as an application running:

- On the same computer for example a Java or Web based software