CAMBRIDGE RESEARCH SYSTEMS

The HardingFPA-X

Administration Manual

Version 2.0.1

Cambridge Research Systems Ltd.
www.hardingfpa.tv

Help ensure video is safe to watch
for both diagnosed and dormant photosensitive epileptics

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Applicable Version:

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Contents

Overview

The HardingFPA-X System is a distributed version of the standalone HardingFPA Flash and Pattern Analyser. It operates in a similar way, but analyses file-based workflows instead of tapes.

Version 2.x of the HardingFPA-X is the newest version of the HardingFPA-X Broadcast Flash and Pattern Analyser, which, if licensed to do so, is capable of analysing High Definition (HD, up to 1080i60) material. For more information on HD licensing, please contact Cambridge Research Systems Ltd.

If analying HD material, the HardingFPA-X analyses using the new Version 3 analysis algorithms, which have been designed specifically for file analysis in the HD world. For compatibility with older algorithms the software can be set up to use SD Legacy Mode, which allows SD material to be analysed using Version 2.5 analysis algorithms which are the same as in the previous 2.54/2.57 versions of the HardingFPA, and Version 1.x of the HardingFPA-X. HD material is always analysed using Version 3 analysis algorithms.

This manual gives an overview of the components in the HardingFPA-X System, and details the installation and configuration process for the system. It *does not* include detailed user instructions for the Client side applications (*HardingFPA-X Submit* and *HardingFPA-X Viewer*). These can be found in the *HardingFPA-X User's Manual*.

Jobs are submitted either via client side interfaces (*Submit* applications) or by dropping the movie files into watch folders. These jobs are then posted to the central database into the *Job Queue*, where they are picked up by analysis installations (running the *Analyser* application) which analyse the material, typically at a greater speed than real-time, and write out results which the client users may then view. The *Analysers* will analyse jobs of a greater priority first, and analyse the earliest submitted jobs first. Only the system administrator has the ability (via the *Supervisor* application) to modify the priorities of jobs and abort jobs.

The HardingFPA-X System is provided as three separate installer distributions:

- *Server*, which contains all the components required to run the analysis, licence the client computers, administer and run the database required for the system to operate.
- *Supervisor*, which is an administrator's tool used for viewing system status and managing the *Job Queue.*
- *Client*, which can be installed on multiple licensed computers, allows users to submit clips to be analysed and view results across a local network connection.

It is entirely possible to install all of the distributions on the same computer (*Server*, *Supervisor* and *Client*), but better performance will be gained if the *Server* components are run on a dedicated computer by themselves, preferably a high-performance multi-core computer.

Optionally, a Web Services interface can be provided via SOAP, using modules for Apache or ISS web-servers (please see the *HardingFPA-X Programmer's Manual* for more details).

The HardingFPA-X components are available for both Windows and Mac OS X. Within your HardingFPA-X

System you may “mix and match” machines running the Mac OS X or Windows versions of the components, in whatever combination you wish.

This manual covers both the Mac OS X and Windows versions of the HardingFPA-X software.

The versions of the components in the current release are detailed in the table below. Please refer to the ***Changes.html*** file that is provided with the HardingFPA-X install packages for details on changes and new features present in this release.

Component	Version	Purpose	Distribution
HfpaPostgreSQL	2.0.0	The main database component, which all other components in the HardingFPA-X System connect to. This database maintains the job lists and results locations. Only one of these is required per HardingFPA-X System.	Server (Mac OS X) SQL Script provided for Windows
 Launcher	2.0.1	Maintains and ensures that the Analyser module continues to run normally at all times.	Server
 Analyser	2.0.1	Analyses movie clips submitted to it via users or from watch folders.	Server
 Monitor	2.0.0	Manages watch folders. Continually scans single or multiple watch folders, submitting movies for analysis. Also facilitates advanced XML-based job submission.	Server
 Licence Server	2.0.0	Provides licences for the client-side applications to run, remotely via a Local Area Network.	Server
 Supervisor	2.0.0	Allows viewing of system status and administrator manipulation of the job queue via the use of job priorities as well as the option to abort jobs.	Supervisor
 Submit	2.0.0	Provides the interface to the job database for client users. Allows submission of new jobs and viewing of results of completed jobs.	Client
 Viewer	3.4.2	Shows graphical and numerical representations of the results of completed jobs to users on a frame-by-frame basis.	Client

Please note that detailed information regarding the operation of the Client components can be found in the *HardingFPA-X User's Manual.*

System Requirements

The HardingFPA-X System is cross platform, and each component can run on both Windows and Mac computers.

The *Server* applications will only run on Intel powered Mac computers, and require Mac OS X version 10.4 or higher for all components. Computers running the *Analyser* component will obtain optimum performance with multi-core processors, with at least 2 GB of RAM.

The *Submit, Viewer* and *Supervisor* applications will also run on Power PC Mac computers, but still require Mac OS version 10.4 or higher.

For Windows platforms, the HardingFPA-X has been tested on Windows XP, Windows 7, Windows Server 2003, Windows Server 2008. Although the HardingFPA-X is compatible with Windows Vista, this operating system is not recommended. At least 2 Gb of RAM is recommended for the best performance if running the *Analyser.*

***Hint:** It is only possible to install the PostgreSQL (database) component of the HardingFPA-X System using the automated Mac installer on a Mac computer which does not already have an installation of PostgreSQL (except for upgrades to the HardingFPA-X PostgreSQL). If you have another application which installs a PostgreSQL database, for example, you may need to install the HardingFPA-X Database on a different computer or manually install the roles and tables for the HardingFPA-X System from the provided* **hfpa.sql** *file.*

***Hint:** The PostgreSQL Database may be limited in the number of connections it may be able to accept, which could impact on the usability of the HardingFPA-X System. If this is the case, then you may install the Database component on a separate computer running a Server version of the operating system (Mac OS X Server or Windows Server 200x) or import the* **hfpa.sql** *file into a PostgreSQL installation running under Linux.*

Licensing

Computers running the *Analyser* and *Licence Server* must have a HASP USB software protection key (see below), and will not operate without one.

The HASP protection key.

Network Settings

All of the computers on your network that you would like to use with the HardingFPA-X System should ideally be on the same IP subnet, for example 192.168.1.*.

This allows the clients to communicate with the *Licence Server*, which relies on clients and the *Licence Server* being on the same subnet. If it is unavoidable that computers are on different subnets, you may still use the HardingFPA-X System, but you will need to specify the location of the *Licence Server* to the *Submit* and *Viewer* applications on all of the client installations that are on a different subnet.

Version Control

The HardingFPA-X System features an automatic version control system to help you keep your system fully up to date. When components start up, they will check with the database to see if their version numbers are valid (i.e. not older than the latest version currently in use).

If the version is not valid the applications will advise the user of this with a message dialogue box and then shut down. In this case you should upgrade all the components in your system to the same version as the newest version.

Version control in the Analyser application

If an application finds, whilst starting up, that it is newer than the rest of the system, the version for the system is updated to the new version number, and the older applications will cease to work until they too are updated.

Movie Files

The *Analyser* modules will open and attempt to analyse any movie file for which the computer it is installed on has the codec. The HardingFPA-X System now includes a number of codecs (see below). Any further codecs required will need to be installed on the computer(s) running the *Analyser* application.

In general, if the file can be viewed correctly using QuickTime (or Windows Media Player) on the computer that the *Analyser* is running on, and is within the accepted limits for frame size and frame rate (see below), then the *Analyser* will be able to analyse it, otherwise the *Analysers* will dismiss the job.

The list of accepted frame sizes and frame rates are as follows:

Version 3 analysis mode:

HD:

1920x1080p23.98, 1920x1080p24, 1920x1080i24, 1920x1080p25, 1920x1080i25, 1920x1080p29.97, 1920x1080i29.97, 1920x1080p30, 1920x1080p50, 1920x1080i50, 1920x1080i59.94, 1920x1080p60, 1920x1080i60
1440x1080p23.98, 1440x1080p24, 1440x1080i24, 1440x1080p25, 1440x1080i25, 1440x1080p29.97, 1440x1080i29.97, 1440x1080p30, 1440x1080p50, 1440x1080i50, 1440x1080i59.94, 1440x1080p60, 1440x1080i60

1280x720p23.98, 1280x720p24, 1280x720p25, 1280x720p29.97, 1280x720p30, 1280x720p50, 1280x720p59.94, 1280x720p60
960x720p23.98, 960x720p24, 960x720p25, 960x720p29.97, 960x720p30, 960x720p50, 960x720p59.94, 960x720p60

SD:

768x576p25, 768x576i25, 768x576p27.97, 768x576i29.97

702 – 720 x 576p25, 702 – 720 x 576i25
702 – 720 x 486p29.97, 702 – 720 x 486i29.97
702 – 720 x 480p29.97, 702 – 720 x 480i29.97

640x480p29.97, 640x480i29.97
384x288p25, 384x288i25
352x288p25, 352x288i25
320x240p29.97, 320x240i29.97

In SD Legacy Mode, the HardingFPA-X will only analyse movies with the following video formats:

702 – 720 x 576p25, 702 – 720 x 576i25
702 – 720 x 486p29.97, 702 – 720 x 486i29.97
702 – 720 x 480p29.97, 702 – 720 x 480i29.97

352x288p25, 352x288i25
384x288p25, 384x288i25
320x240p29.97, 320x240i29.97

The HardingFPA-X uses the following frameworks to access video frames:

- FFmpeg
- QuickTime
- DirectShow (on Windows only)

When presented with a file, a framework is selected based on the movie file extension.

MXF Files

An attempt is made to open the MXF file using the HardingFPA-X internal MXF library. This library has support for OP1A and OP ATOM wrapped MXF files with the following codecs:

- D10 (IMX)

- DV
- DVCPRO
- DVCPRO HD
- DNxHD

If the HardingFPA-X's internal MXF library does support the MXF file format, then the HardingFPA-X's FFmpeg library is used to decode these frames. The HardingFPA-X MXF library includes support for AVID MXF files as well as MXF time code tracks.

If the MXF file format is **not** supported by the HardingFPA-X's internal MXF library, an attempt is made to use the HardingFPA-X's FFmpeg library to open the file directly. In this case, the MXF time code track is not supported. To compensate for this an attempt will be made to use the VITC information, if any, embedded in the video material.

On Windows platforms, if all else fails an attempt to use DirectShow (using any codecs installed in the system) will be made. If this is successful, an attempt will be made to use the VITC information, if any, embedded in the video material.

MOV Files

The HardingFPA-X's QuickTime library will be used to open QuickTime files. File support depends on the QuickTime codecs that are installed on the machine used for analysis. The QuickTime library supports QuickTime timecode tracks. The HardingFPA-X does not support multi-track QuickTime movies.

Other Files

Firstly the use of FFmpeg is attempted, followed by an attempt (on Windows platforms only) to use the DirectShow framework.

Why use FFmpeg

- FFmpeg provides a uniform set of embedded codecs that allow for consistent results across different platforms and installations.
- If a previous version of the HardingFPA-X Analyser used DirectShow or QuickTime, and a newer version uses FFmpeg, there is a possibility that the results will differ due to the slight differences between codec algorithms. The use of FFmpeg in current and future versions of the *HardingFPA-X* product range will mitigate this problem.
- FFmpeg in many cases removes the requirement of purchasing 3rd party MXF support and Codecs as the MXF library, in conjunction with FFmpeg, now fulfills this requirement.

The HardingFPA-X's FFmpeg library supports the following codecs:

D10 (IMX), DV, DVCPRO, DVCPRO HD, DNxHD, MPEG1VIDEO, MPEG2VIDEO, H261, H263, RV10, RV20, MJPEG, MJPEGB, MPEG4, MSMPEG4V1, MSMPEG4V2, MSMPEG4V3, WMV1, WMV2, H263P, H263I, FLV1, H264, INDEO3, VP3, THEORA, ASV1, ASV2, FFV1, MSVIDEO1, SNOW, XVID, FFVHUFF, INDEO2, FRAPS, VP5, VP6, VP6F, FFH264.

Installation (Mac OS X)

This section describes the installation of the Mac OS X components.

Prerequisites (Mac OS X)

In order for the *Analyser* and *Licence Server* parts of the *Server* distribution to work correctly, a USB HASP key must be installed, and therefore the HASP drivers must be installed. To install these, double-click on the ***HDD_Installer_MacOSX.dmg*** icon.

The disk image for the HASP key driver installer

This will mount the disk image containing the driver installer. This screen can be seen below. Double-click on the ***Install HASP USB Driver*** icon within this image to install the driver.

The HASP Installer disk image contents

Server Installation (Mac OS X)

***Warning:** If you are updating the HardingFPA-X from a previous version, you must firstly remove the database from the system. Check that no Analysers, Monitors, Submits or Supervisors are running on your local network, and run the following command in a terminal window:*

sudo /Library/HfpaPostgreSQL/bin/uninstall.sh

It is also recommended that any previous installations of HardingFPA-X are removed.

The Server install package for Mac OS X

- Double-click on the *HfpaServer* installer package as shown above. The installer will then start and the following dialogue box will open:

Server installer

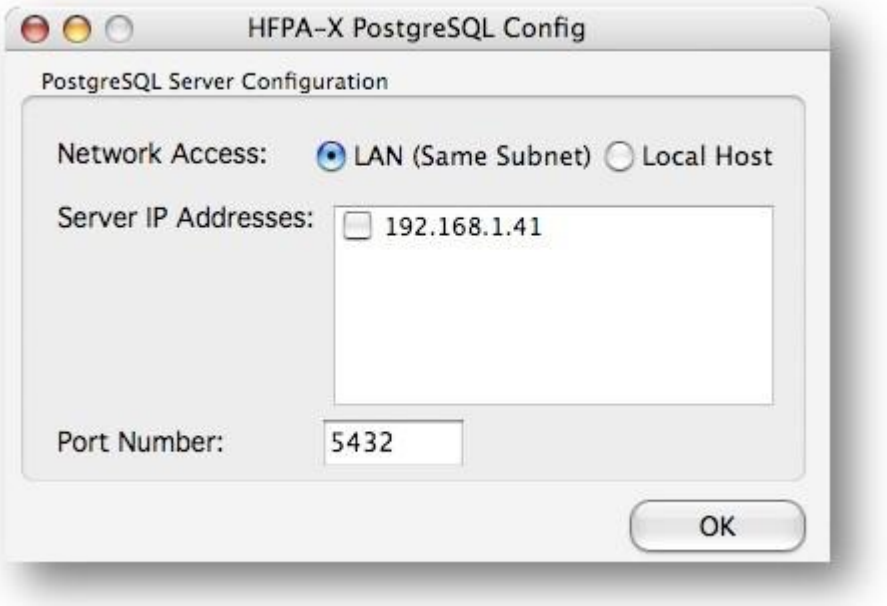
- Click on *continue*, then read the "Read Me" text and accept the licence terms displayed on the next screen.
- Select which volume (hard disk) you would like to install the server applications to.
- Select which of the components you would like to install. The *PostgreSQL* component is a database that is required for the HardingFPA-X system to run correctly, but will typically be installed on only one of the computers on your network, so if you are installing a second or third *Analyser* node for example, you should de-select this option. Additionally, the *Licence Server* is only required on one computer in a typical installation so if you already have a computer with this installed on, de-select this option as well.

Choosing which Server components to install

- Wait for the installation to complete.

Server installation progress

- After completion, the *PostgreSQL* (database) configuration utility will appear. If you only require the system to be run from the same computer, and have no remote clients, then choose *Local Host*. If you would like to be able to connect client computers from across your network, then select the appropriate IP addresses for your local network cards by checking the relevant boxes.



PostgreSQL configuration utility

- It is usually sufficient to leave the port number set to 5432, but if you know that this port is being used by another service or application, it is possible to customise the port that the database runs on by entering a new port number into the box provided. Please make a note of these settings in order to configure the other components in the system.

- Click *OK* to complete the installation.

The installed applications will appear under Applications → HFPA-X in Finder.

The HardingFPA-X applications, once installed

Client Installation (Mac OS X)

Please note that before installation, it is recommended that any previous installations of HardingFPA-X are removed.

The Client install package for Mac OS X

Double-click on the *HfpaClient* installer package shown above.

The installer will then start.

Select which volume (hard disk) you would like to install the client applications to.

Click on *continue* and wait for the installation to complete. There is no configuration utility for the client side software during the install process, so once this has completed, all the client components will be installed under Applications → HFPA-X in Finder.

Supervisor Installation (Mac OS X)

Please note that before installation, it is recommended that any previous installations of HardingFPA-X are removed.

Note: If the *HardingFPA-X Supervisor* is installed on a the same computer as the database, then the password login is disabled, and any user running it will be able to login and therefore change the priorities of jobs in the system and abort jobs already running.

The Supervisor install package for Mac OS X

Double-click on the *HfpaSupervisor* installer package shown above.

The installer will then start.

Select which volume (hard disk) you would like to install the *HardingFPA-X Supervisor*.

Click on *continue* and wait for the installation to complete. There is no configuration utility for the Supervisor software during the install process, so once this has completed the *HardingFPA-X Supervisor* will be installed under Applications → HFPA-X in Finder.

Installation (Windows)

This section describes the installation of the Windows components.

Server Installation (Windows)

Please note that before installation, it is recommended that any previous installations of HardingFPA-X are removed.

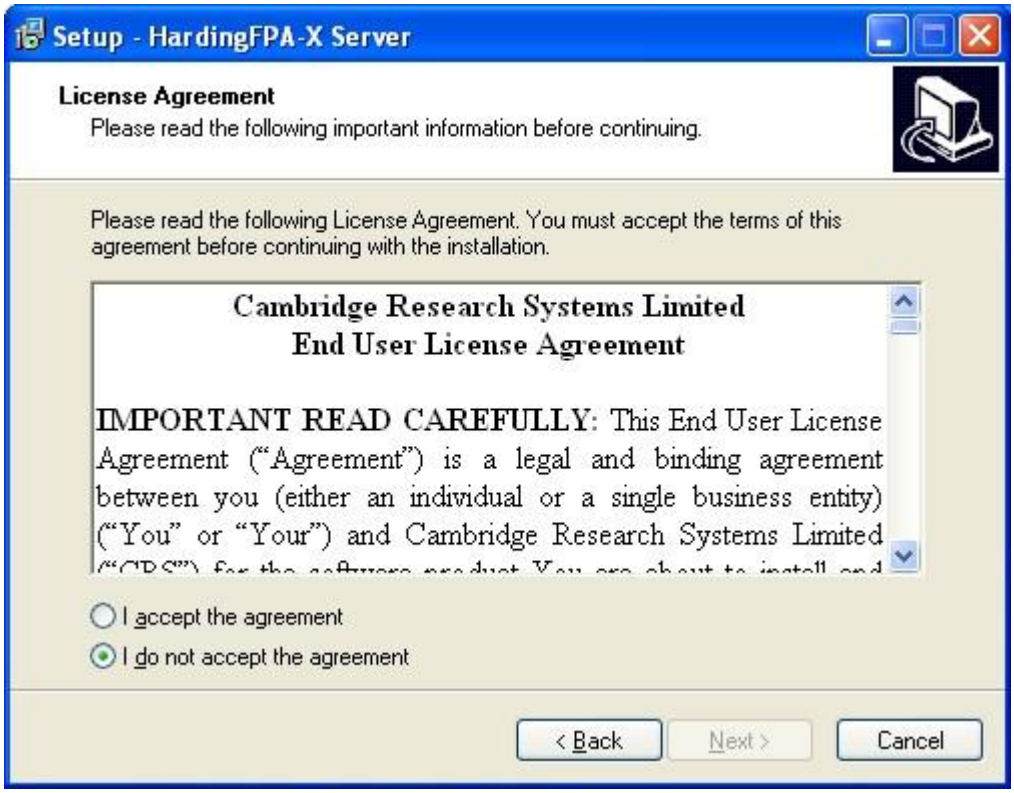
Note that the Windows installation of the Server components do not by default include a database component. Please see the section on Database Installation (Windows) for more information.

The Server install package for Windows

Double click on the *HardingFPA-X Server Setup.exe* installer shown above. The installer screen below will then be displayed.

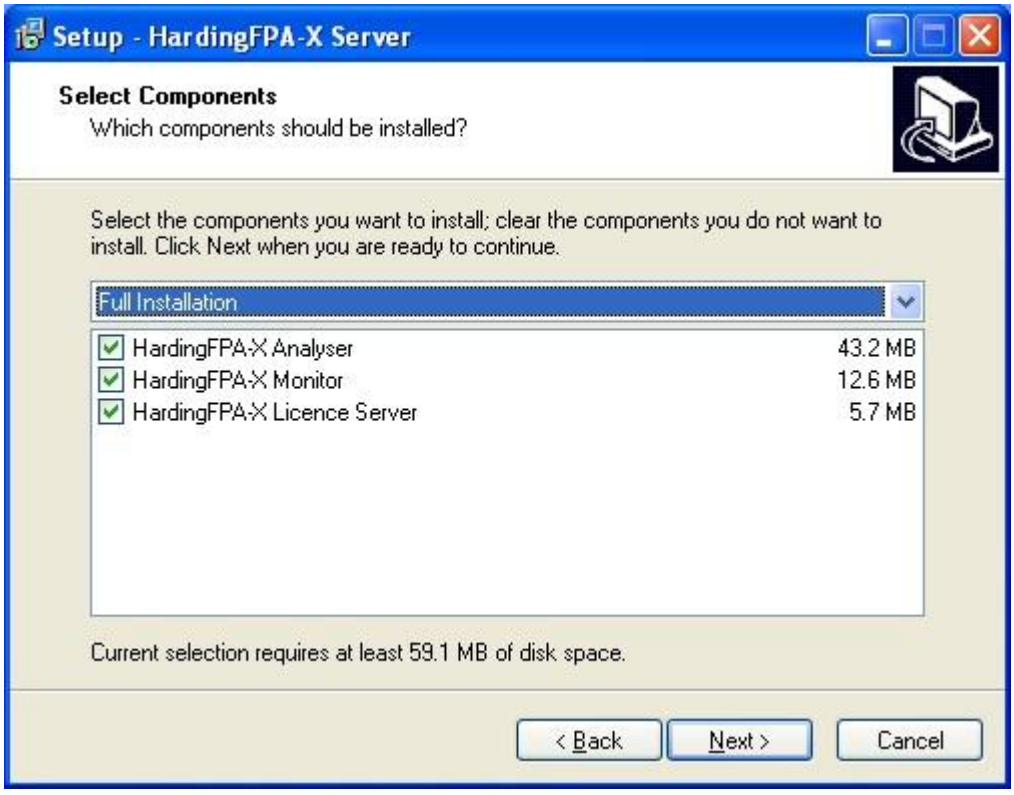
Windows Server Installer

Click *Next.* Read and accept the licence terms. If you cannot accept these licence terms, please cancel the installation and contact Cambridge Research Systems Ltd.:

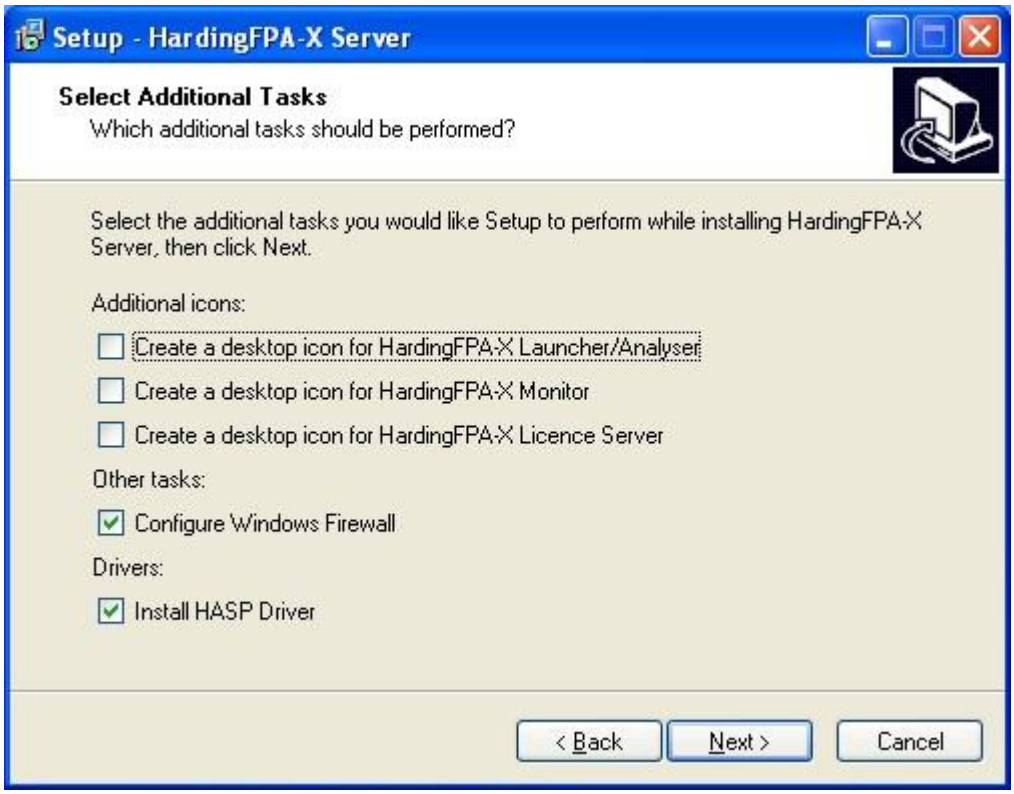


Windows EULA licence terms

On the next screen select where to install the software. The screen below will appear, allowing you to install only the components you require.

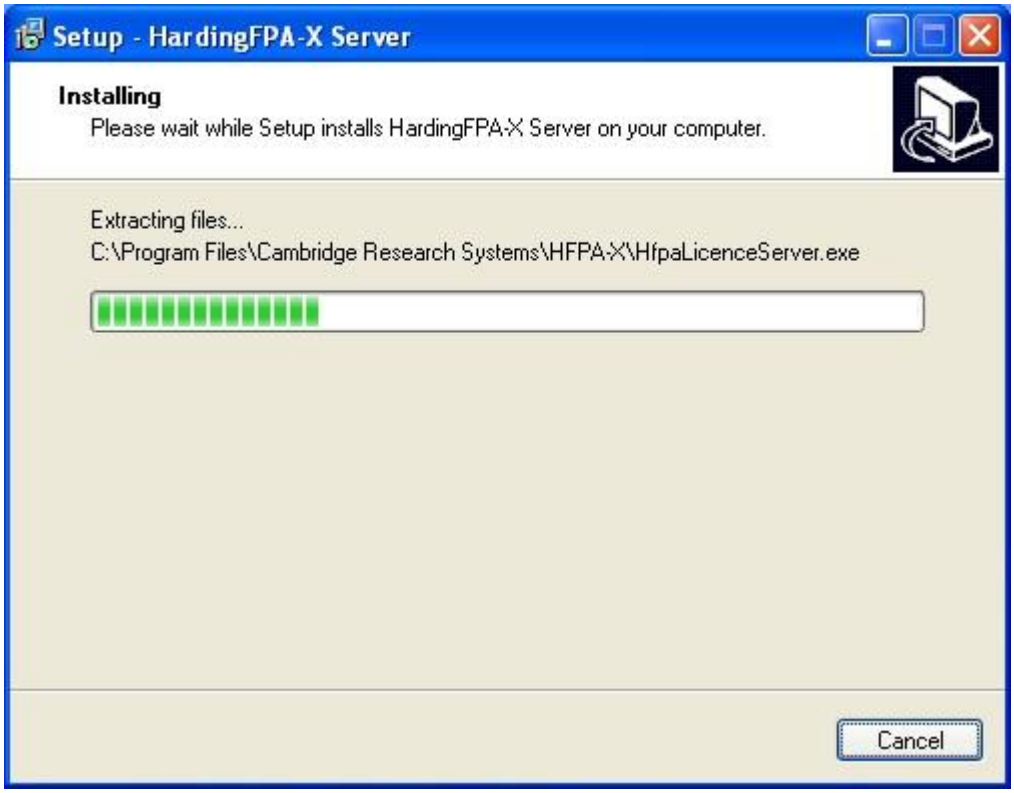


Click *Next*, and select whether or not to include shortcuts on the Desktop. If you selected to install the *Licence Server*, the computer will need to accept incoming connections which may be blocked by the Windows Firewall. The *Licence Server* uses numerous ports automatically depending on the computer's configuration. To open connections automatically, click the "Configure Windows Firewall" option shown on the options screen below. "Install HASP Driver" is only checked if it is not already installed previously, but can be checked manually on this page should you wish to reinstall it.



Selecting Options in the Windows Server Installer

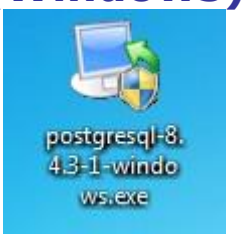
The installer will then install the chosen applications (see below). The required HASP drivers and runtimes will also be installed at the same time, and may require you to restart the computer on completion.



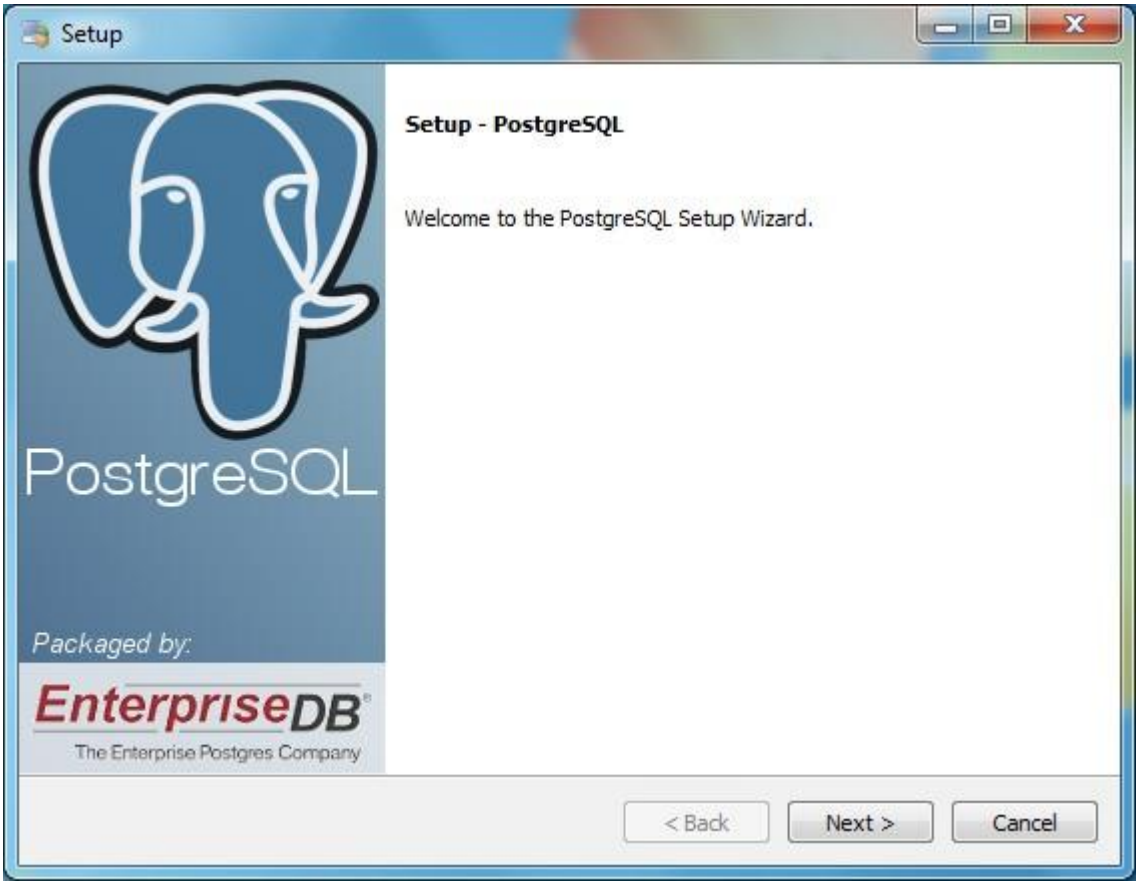
Installing

After clicking Finish, the chosen applications will have been fully installed, and will appear (by default) under the *HFPA-X* group on the Start Menu.

Database Installation (Windows)

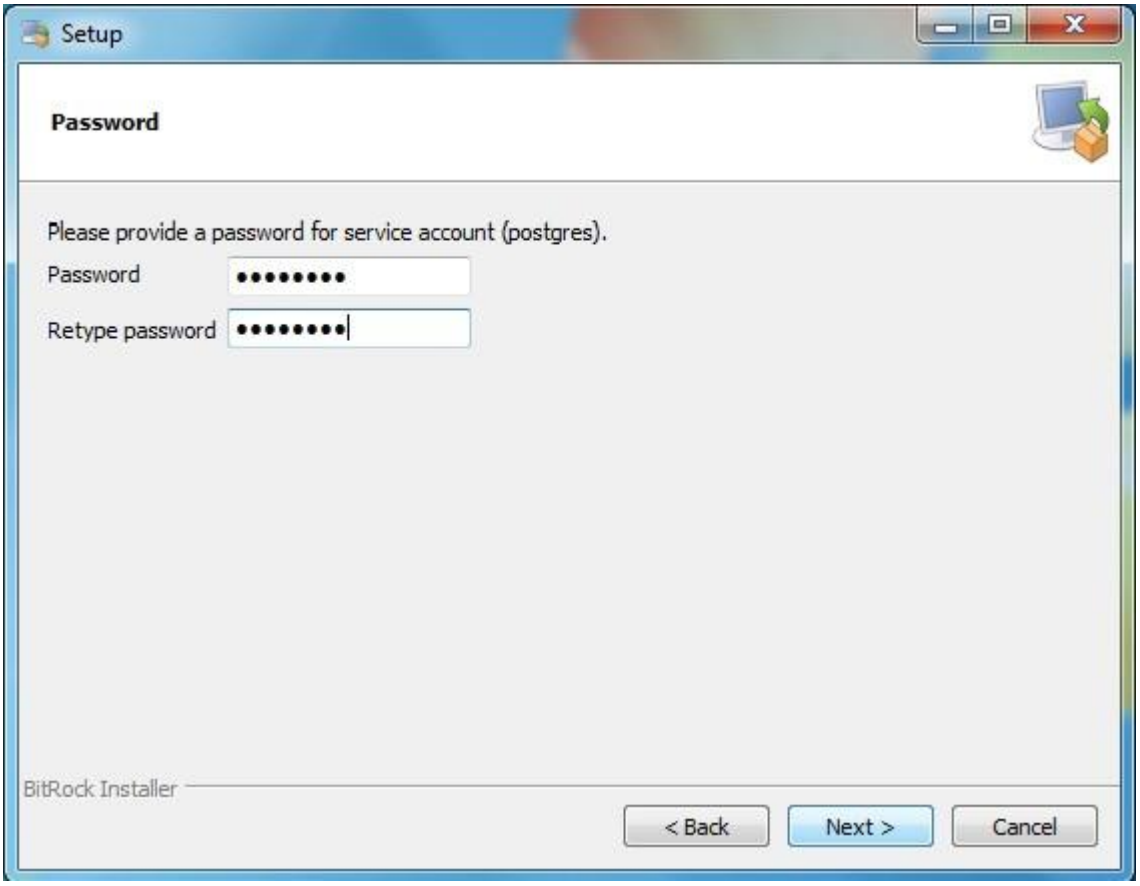


Double-click the postgresql-8.4.3-1-windows.exe file.The following screen appears, click “Next”:

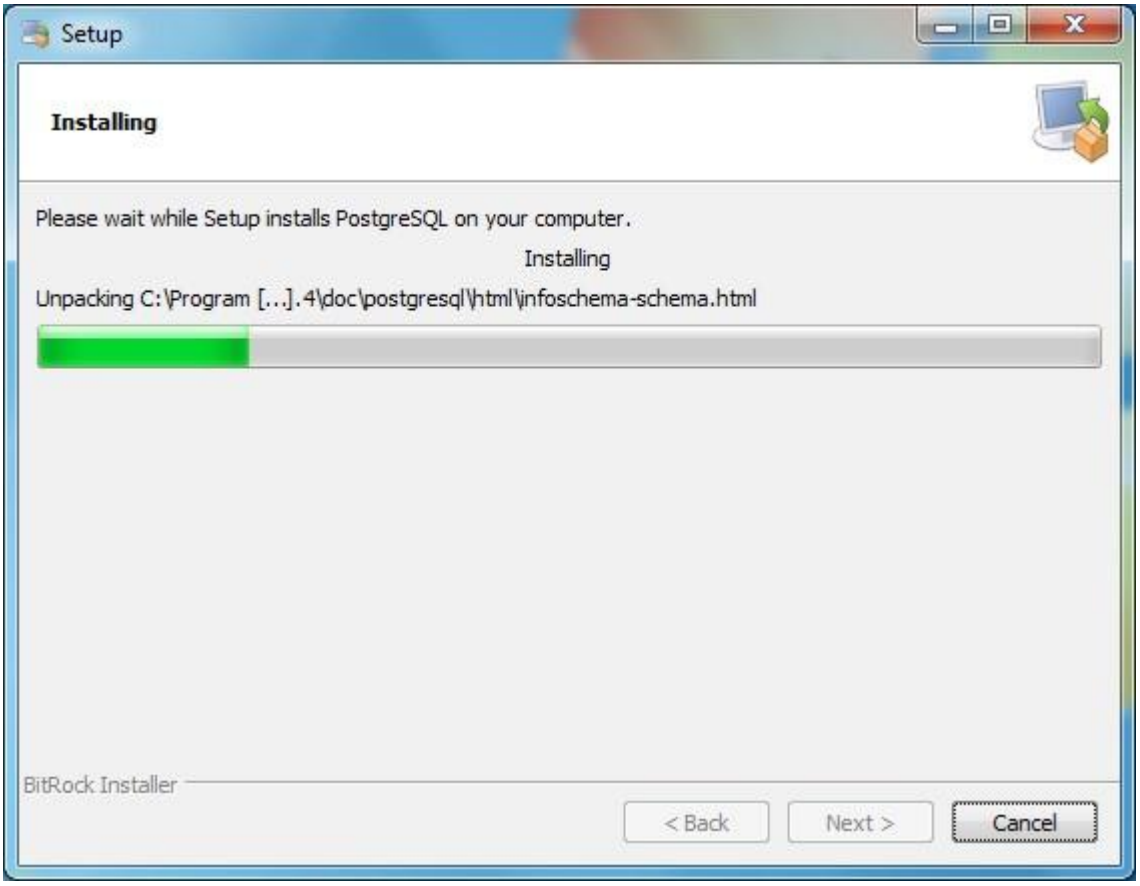


On the next screens, choose the installation directory and click "Next"

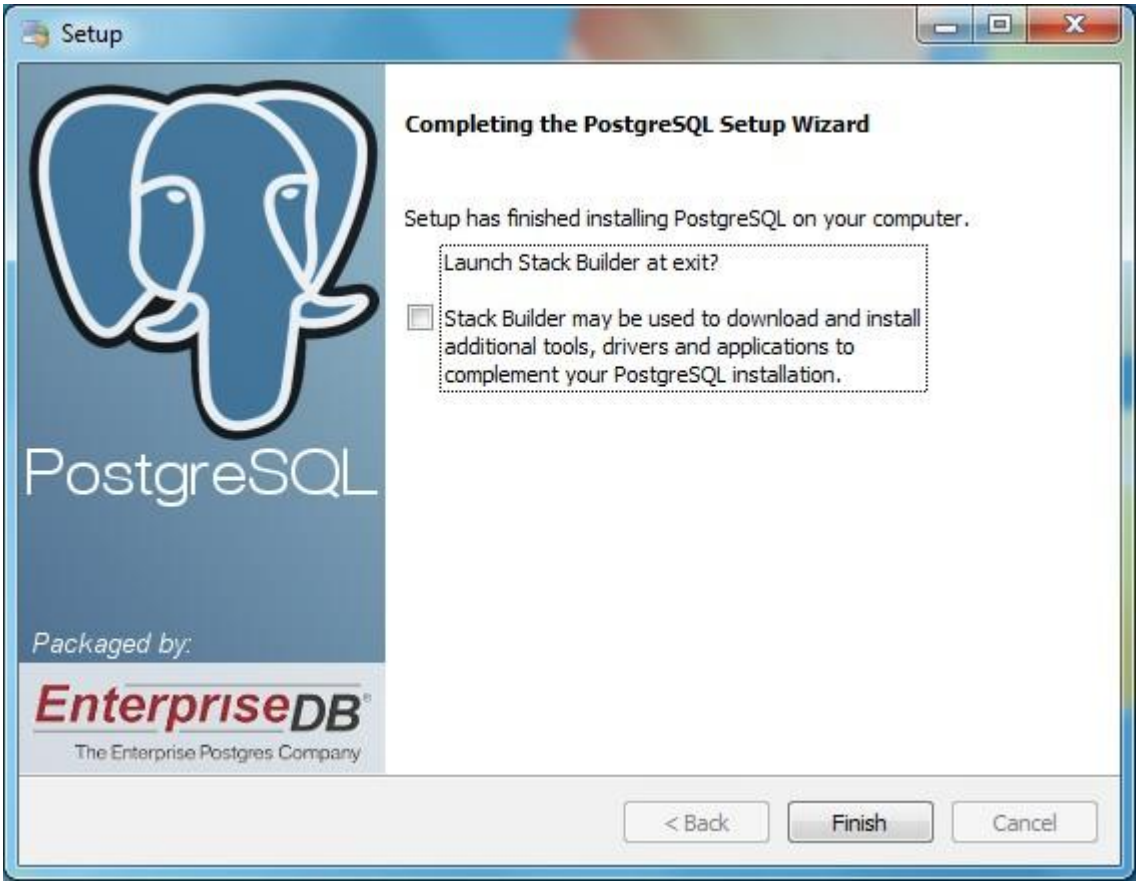
On the password screen, set a password for the new PostgreSQL Windows user, as shown below:



Click “Next”, then “Next” again to start installing. See below:

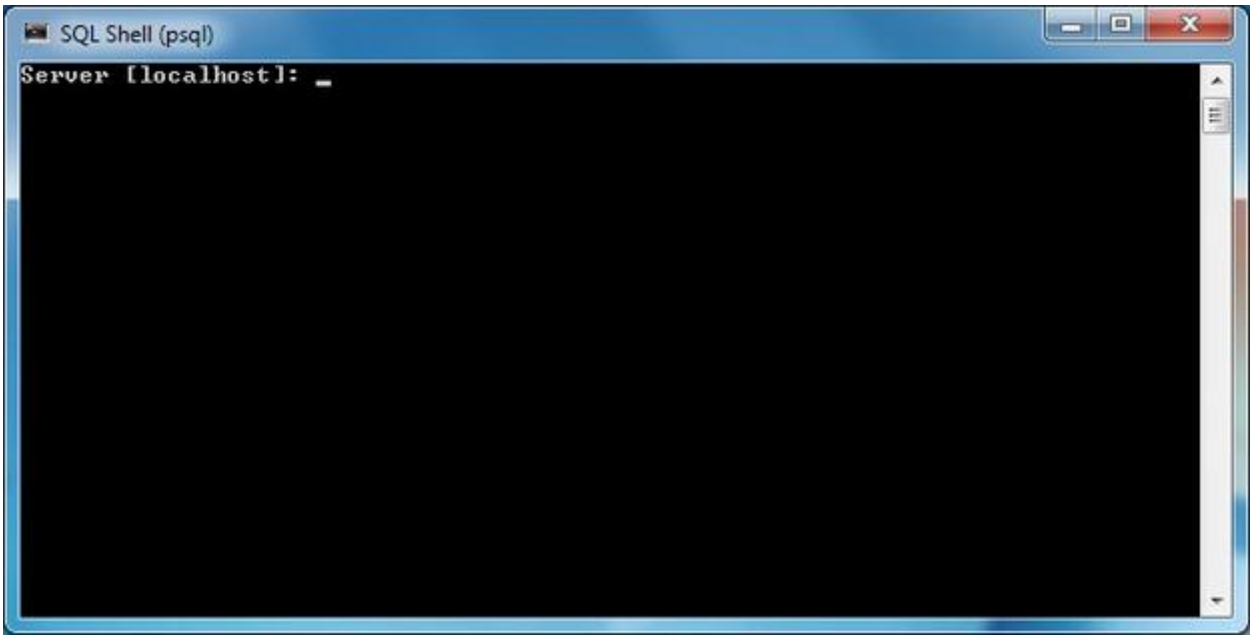


The final screen (shown below) will appear. Uncheck the box “Launch Stack Builder at Exit” and click “Finish”.



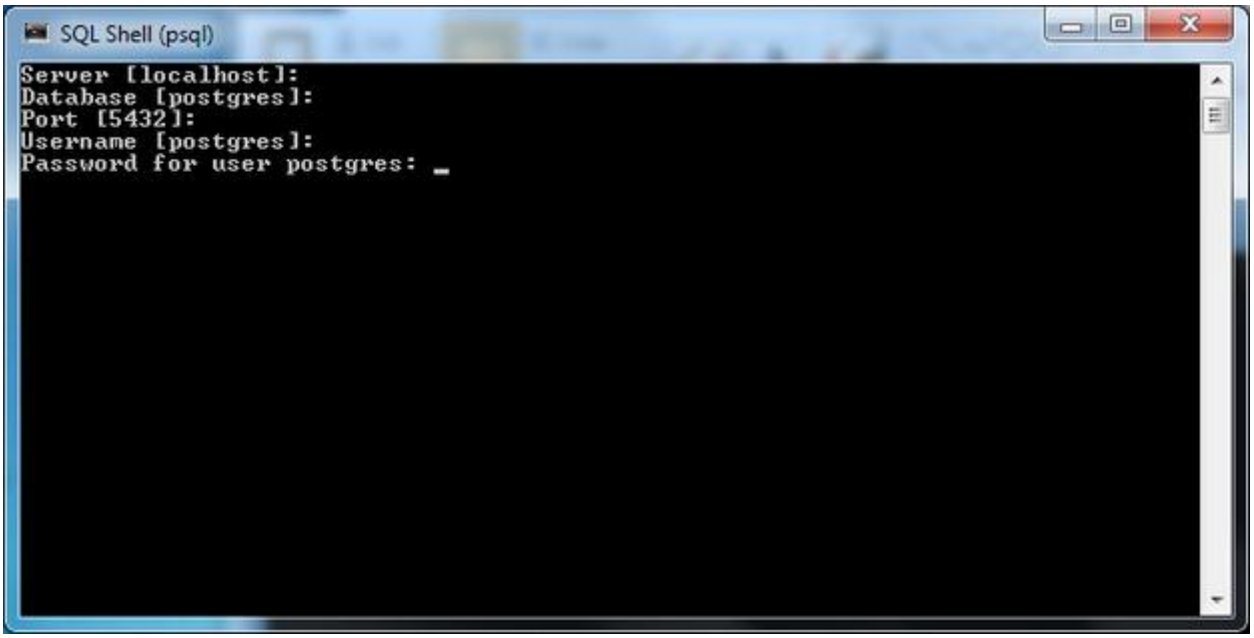
Copy the ***hfpa.sql*** file from the HardingFPA-X installation media to the `C:\temp` folder of your computer.

Under *PostgreSQL 8.4* on the start menu, open (click) the SQL Shell (psql) menu item. This will open a command prompt that looks something like the one shown below:



Press Return 4 times. When at the screen below, enter the password you set earlier for the postgres Windows

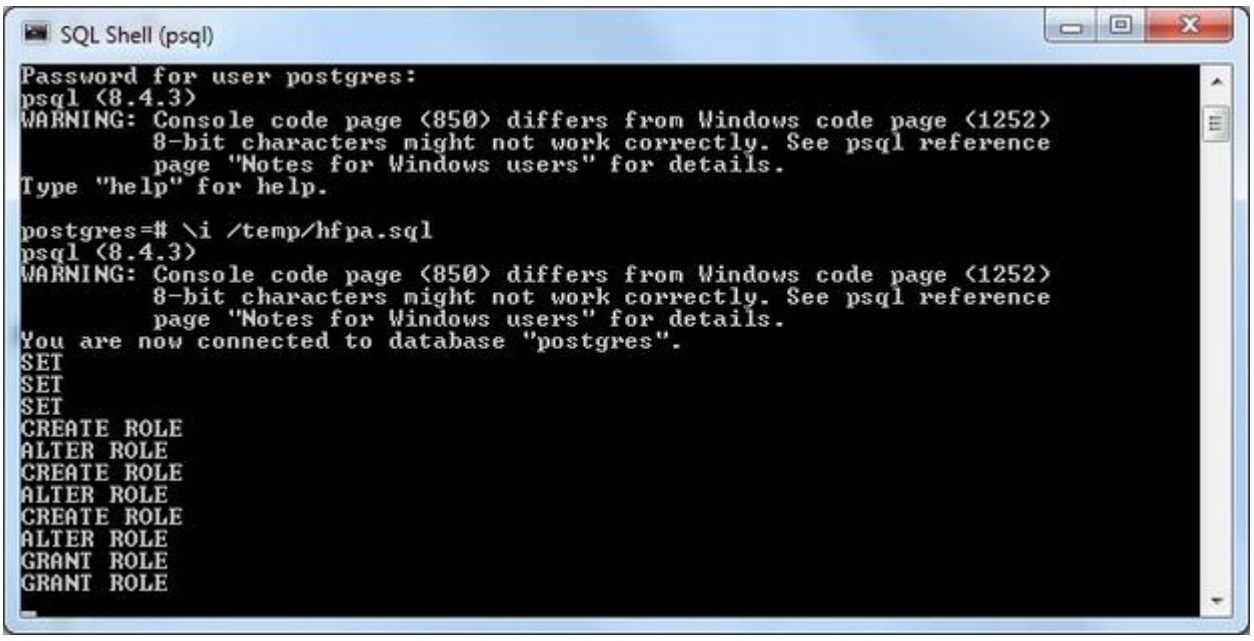
user to log in to the SQL shell.



Once logged in, enter the following command:

`\i /temp/hfpa.sql`

and press Return. The roles and databases for the HardingFPA-X system will be created (see below):



In order to allow PostgreSQL to accept connections from hosts other than the local host, the file named `pg_hba.conf`, which is typically located at the installed location eg.

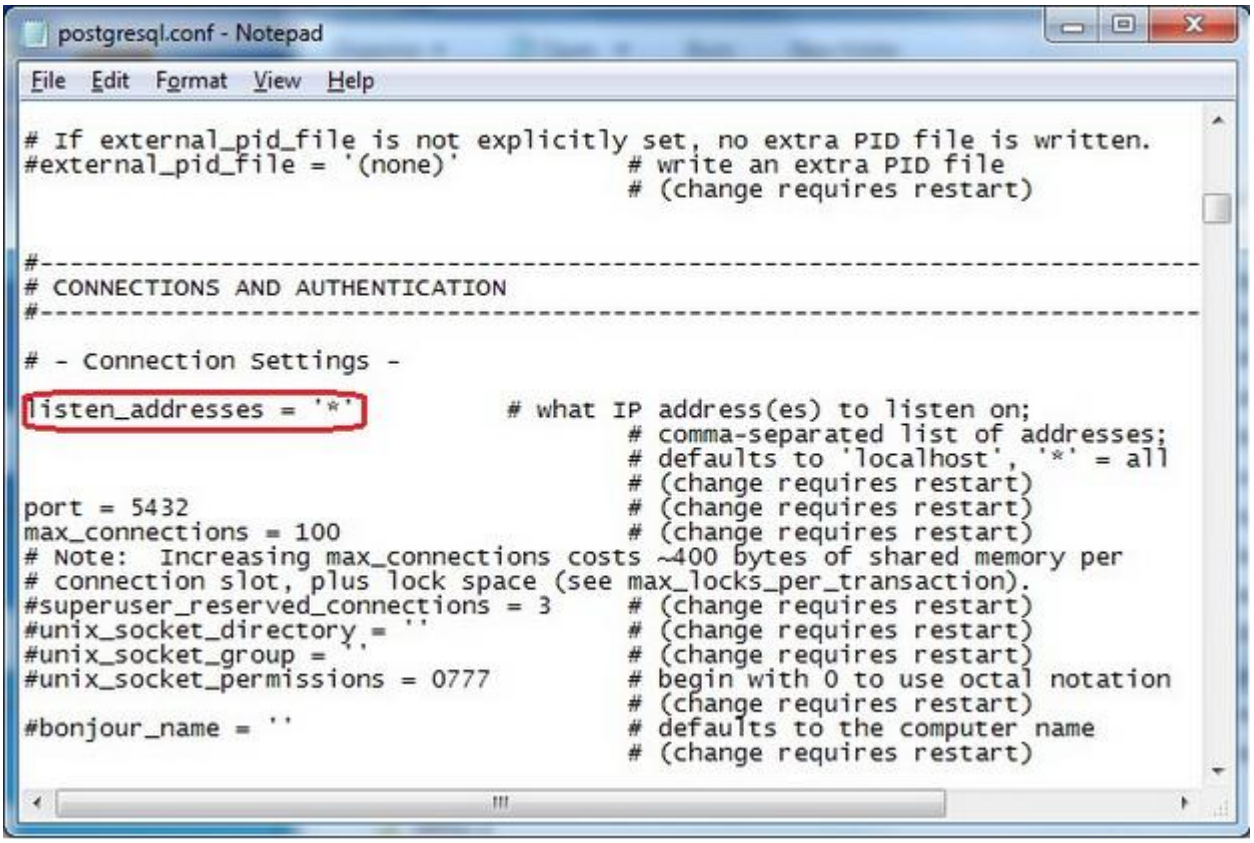
`c:\Program Files\PostgreSQL\8.4\Data\pg_hba.conf`

must be edited by adding the following line to the bottom of the file.

```
host    all         all           192.168.0.0/24       md5
```

Please note that the IP address/subnet mask combination (in CIDR notation), for example 192.168.0.0/24 in the line above, should match *your* network's subnet range.

Make sure that the `listen_addresses` are set to '*' in the file `c:\Program Files\PostgreSQL\8.4\Data\postgreSQL.conf`. see below:



Restart the computer.

Client Installation (Windows)

Please note that before installation, it is recommended that any previous installations of HardingFPA-X are removed.

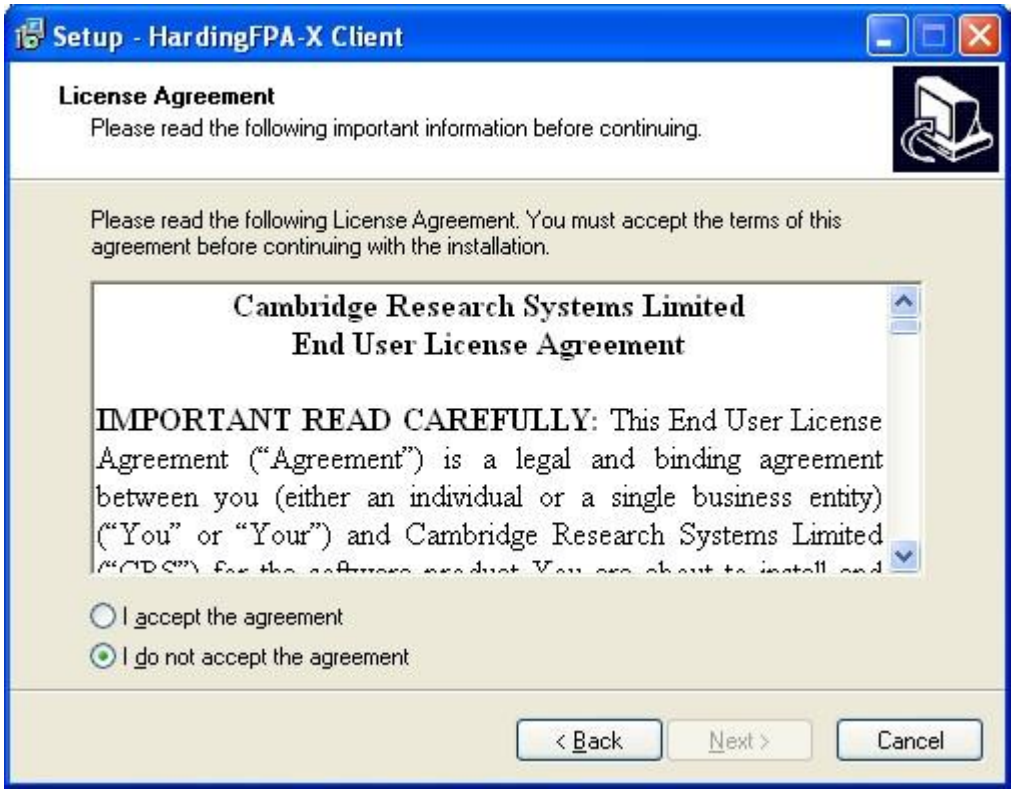
The Client install package for Windows

Double-click on the *HFPA-X Client Setup.exe* installer package shown above.

The installer screen below will then be displayed.

Windows Client Installer

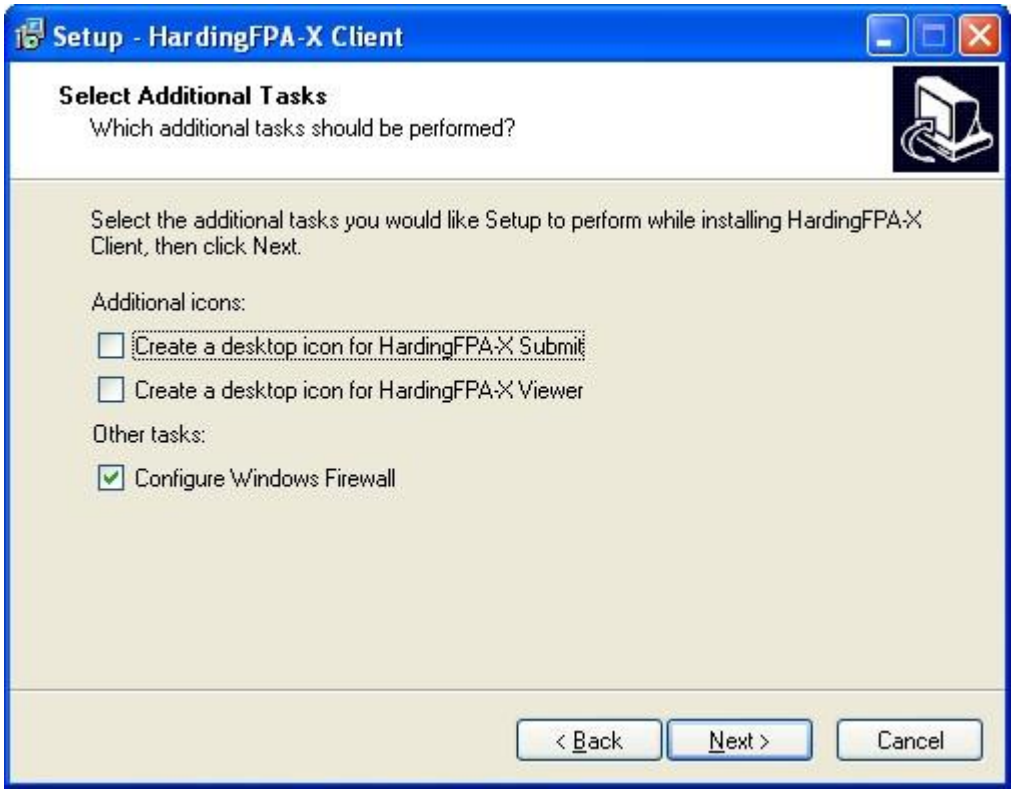
Click *Next.* Read and accept the licence terms. If you cannot accept these licence terms, please cancel the installation and contact Cambridge Research Systems Ltd.:



Windows EULA licence terms

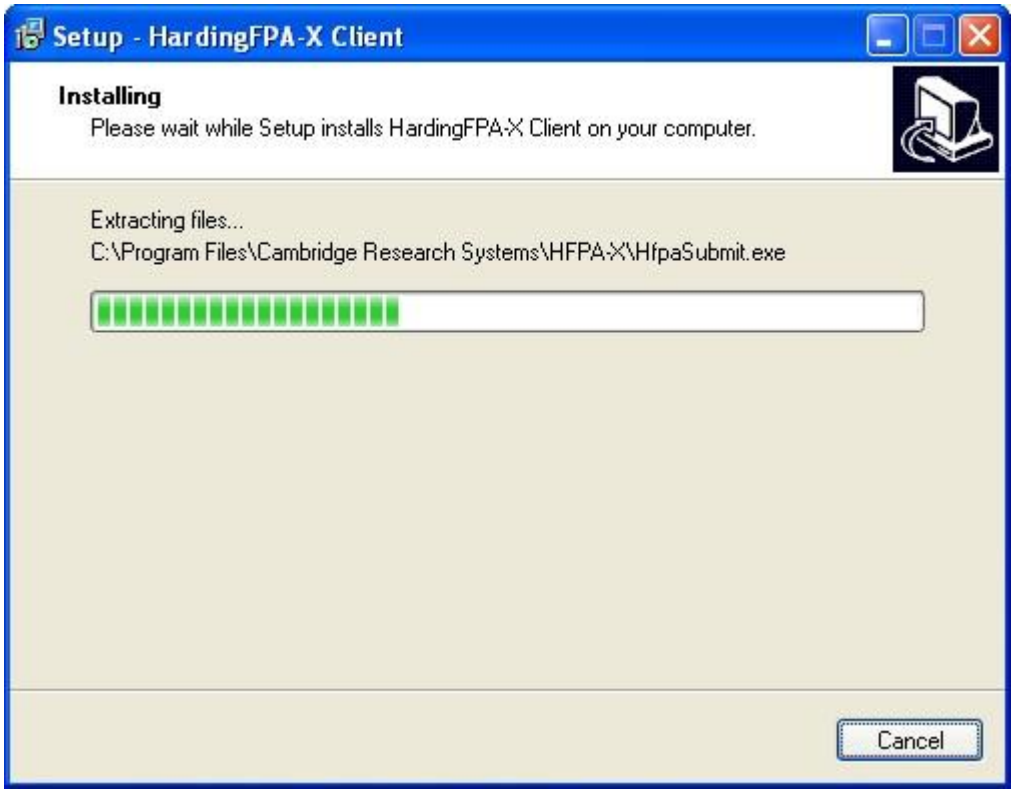
On the next screen select the location into which the software is to be installed, and whether to include desktop shortcuts.

In order to operate properly, the client applications need to make connections across the network to a *HardingFPA*-X *Licence Server* which may be blocked by the Windows Firewall. The applications use numerous ports automatically depending on the computer's configuration. To automatically configure the firewall, click the "Configure Windows Firewall" option shown below.



Windows Client Firewall configuration

Click *Next*, then click *Install*. Wait for the installation to complete.



Windows Client install progress

After clicking *Finish*, the *HardingFPA-X Submit* and *HardingFPA-X Viewer* will have been fully installed, and will appear (by default) under the *HFPA-X* group on the Start Menu.

Supervisor Installation (Windows)

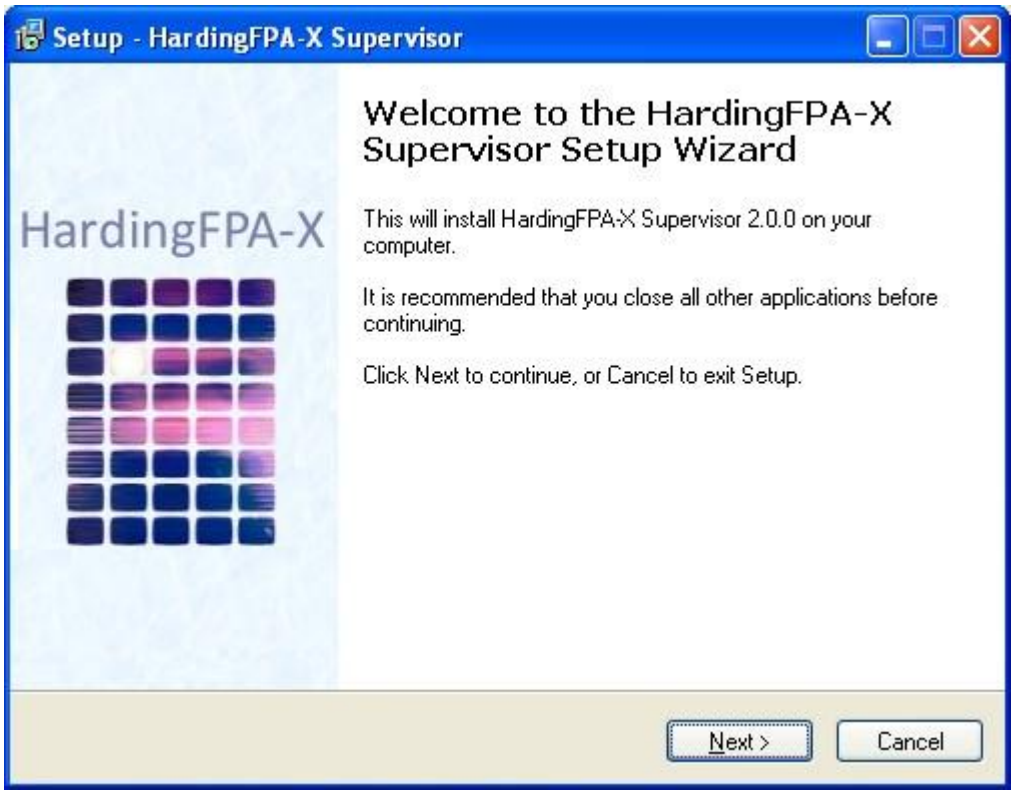
Please note that before installation, it is recommended that any previous installations of HardingFPA-X are removed.

Note: If the *HardingFPA-X Supervisor* is installed on a the same computer as the database, then the password login is disabled, and any user running it will be able to login and therefore change the priorities of jobs in the system and abort jobs already running.

The Supervisor install package for Windows

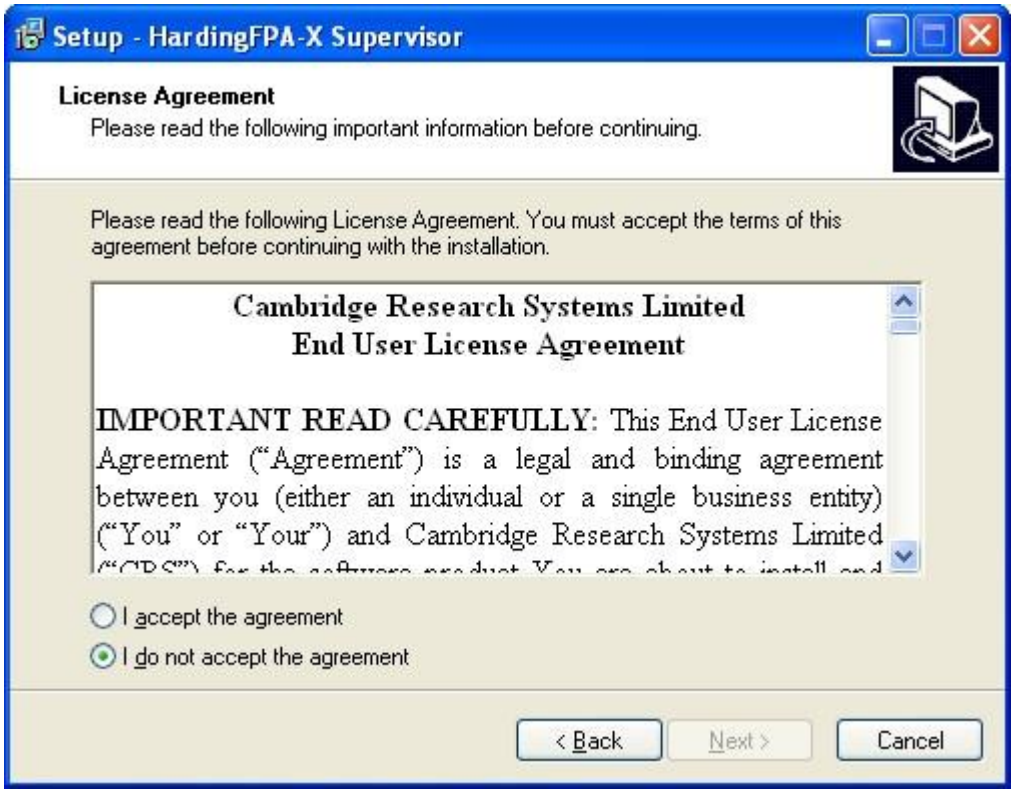
Double-click on the *HFPA-X Supervisor Setup.exe* installer package shown above.

The installer screen below will then be displayed.



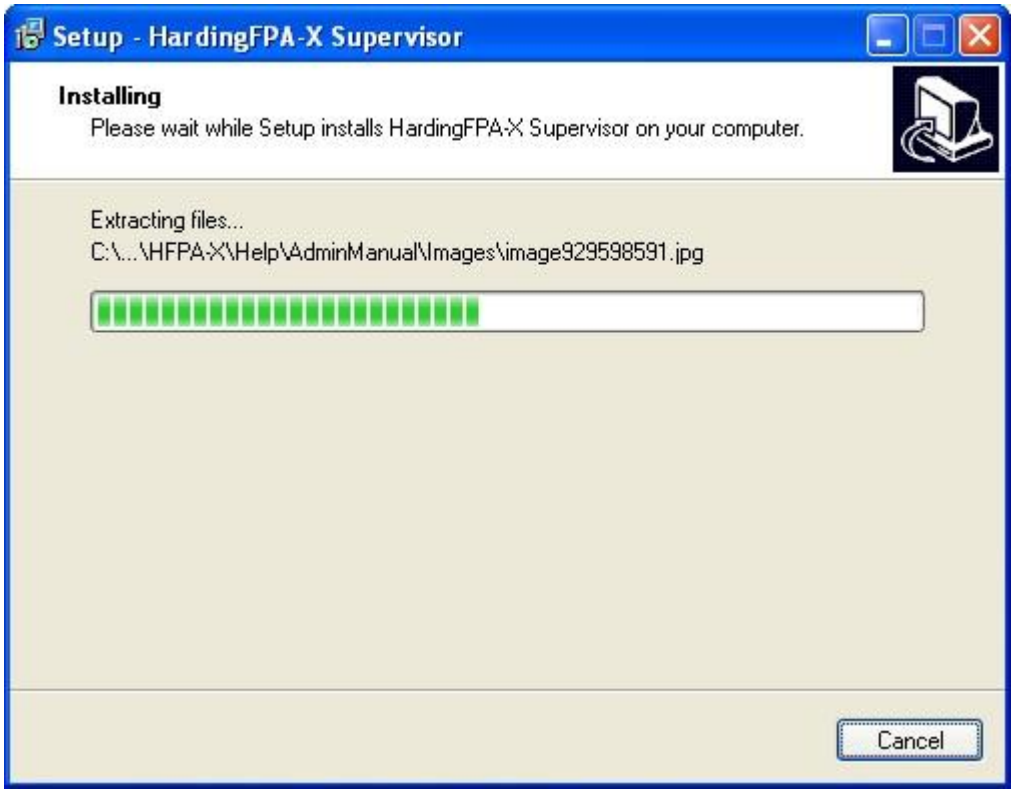
Windows Supervisor Installer

Click *Next.* Read and accept the licence terms If you cannot accept these licence terms, please cancel the installation and contact Cambridge Research Systems Ltd.:



On the next select the location into which the software is to be installed, and whether to include desktop shortcuts or not.

Click *Next*, then click *Install*. Wait for the installation to complete:



After clicking *Finish*, the *HardingFPA-X Supervisor* will have been fully installed, and will appear (by default) under the *HFPA-X* group on the Start Menu.

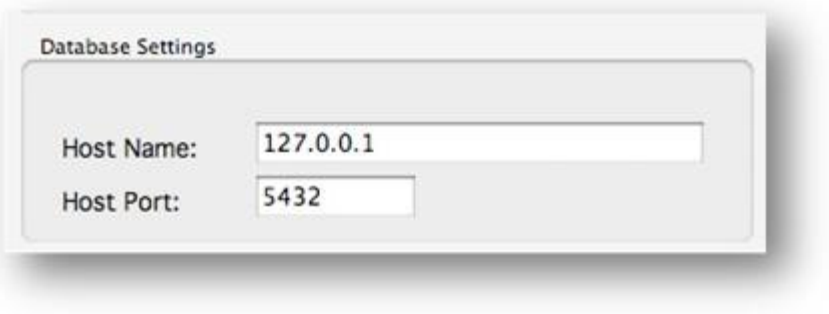
HardingFPA-X Components and Settings

When you have installed the applications to the required computers, each will need to be configured in order for the applications to know where to find the database, and which paths to use to find the movies, results files etc.

This section describes the operation and settings (configuration) for the HardingFPA-X System. Some settings are common between applications such as database settings, so please refer to the whole section if you cannot find the information you need.

Common Database Settings

Many of the applications in the HardingFPA-X System (*Submit*, *Monitor*, *Supervisor* and *Analyser*), have common settings which relate to the location on the network of the HardingFPA-X Database component. These *"Database Settings"* can be found under *Tools* → *Settings* on these applications and appear as shown below.



Common settings for database location

Host Name: This is the host name or IP address of the computer on which the database is running. There must be only one HardingFPA-X Database on the network for a given system.

Host Port: This is the port number of the database in the system. Unless this was changed during installation, it should be left at its default value of 5432.

Any changes made to the database settings will require the relevant application to be restarted before the changes are made.

Language Support

All of the HardingFPA-X applications support multiple languages. In many of the applications (excluding *Launcher* and *Licence Server*), English and Japanese can be selected from the Tools → Languages menu. All applications will start up in the local language by default, providing the translation files are present.

Note: only English and Japanese languages are currently officially supported, although you may translate the applications yourself (see below).

To add a new language yourself, find the /languages/ subdirectory of the application bundle (on Mac) or program directory (on Windows) and make a copy of each of the **.po* files, replacing *'en'* with the two letter code for your locale (eg *MainUnit.fr.po* for French). You may then enter the strings after **msgstr** in this file, between the "" quotation marks. Ensure the **.po* files are saved in the UTF-8 format (without BOM). An example is shown below for some menus translated into Japanese. these would be stored in *xxxxx.**jp**.po*.

```
#: main:rssettings
msgid "Settings"
msgstr "設定"

#: main:rshelp
msgid "Help"
msgstr "ヘルプ"
```

Note that on the Mac platform, you must set one of the environment variables 'LC_ALL', 'LC_MESSAGES' or 'LANG' to the two letter code for your locale (e.g. 'jp' for Japanese etc.) for the applications to launch into your language automatically. This will need to be done on all client computers as well.

HardingFPA-X PosgreSQL Database

This is the main 'job' database which manages the parameters for all of the elements of the system, including jobs, file locations, HardingFPA-X system information etc. All of this information is managed transparently by the different components of the system.

You must install and configure the database on *one* computer in your network so there will be only one Database installation to which all clients, applications and *Analysers* connect to. This database stores all information relevant to the jobs being analysed, pending jobs and completed jobs and allows the HardingFPA-X system to be as flexible as possible (being extensible by allowing multiple clients and *Analyser* nodes).

The database does not require manual start-up. It runs as a service, and will therefore be running whenever the computer that it is installed on is switched on.

All management of the database is performed by the HardingFPA-X applications, and so there is no direct user interface to the database. It should be noted however that as the IP address for the database must be entered into the settings for most of the other HardingFPA-X applications, it is a requirement that the computer running the Database has a static IP address.

If required (for upgrade or maintenance for example), the database may be removed from the computer on which it was installed by:

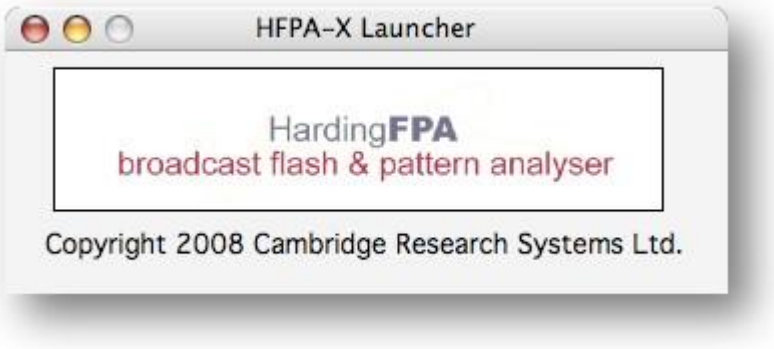
Windows XP: using Add/Remove Programs to remove PostgreSQL.

Windows Vista/Windows 7: Using Programs and Features to remove PostgreSQL.

Mac OS X: Run the script ***uninstall.sh*** which can be found in ***/Library/HfpaPostgreSQL/bin/***

HardingFPA-X Launcher

This application is a small 'helper' application that makes sure that the *Analyser* is always active and ready to receive jobs. It needs to be run on the same computer as the *Analyser*, and should be installed on any computer that has an *Analyser* installed.



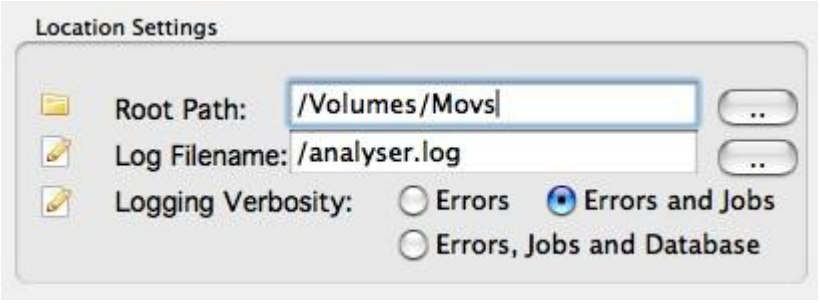
The HardingFPA-X Launcher window

If the *Analyser* is inadvertently shut down for any reason, the *Launcher* will restart it. If you need to close the server side down, for example to upgrade it or restart the computer it is running on, you will need to quit the *Launcher* first before quitting the *Analyser*.

The correct way to start up the *Analyser* is to start the *Launcher* first and allow the *Launcher* to start up the *Analyser.* This ensures the system is protected against unexpected shut down of the *Analyser*. There is no configuration necessary for the *Launcher*. The *Launcher* will run in the system tray on Operating Systems that support this feature.

Storage and Paths

In order for the HardingFPA-X System to operate correctly, all computers must be able to access movie files that they would like to 'submit' or 'analyse', and the applications must be correctly configured to allow this. The HardingFPA-X applications all provide a *Location Settings* section in order to specify this information.



Location settings section

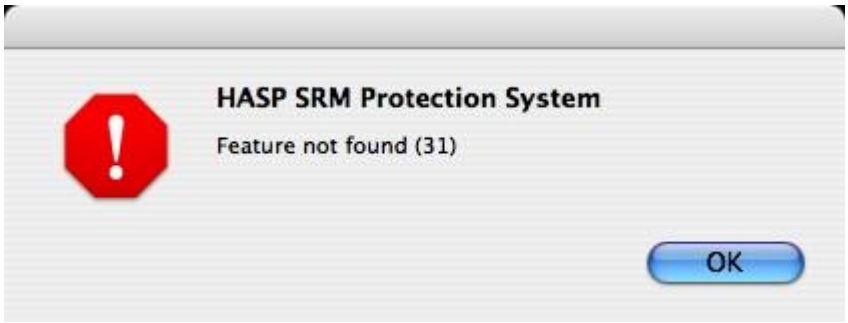
In a typical usage scenario, the movie files are stored on a SAN or shared network drive. In this case, all of the *Analysers* and *Submits* in the system must be able to access this SAN, in order to be able to locate the files in question. The actual path used to access the same file from more than one computer may not be identical, so the Settings screen (*Tools* → *Settings*) for the *Analyser*, *Monitor* and *Submit* contain the following settings in order to specify the location of:

Root Path: This is the location of the root of your storage system. This folder will be the same actual folder for both the server computer and each of the clients, but as the folder might be mounted differently on each of the clients, this is the mount point that refers to that location from the *current computer* only, and so might be different on each computer.

Log Filename: Some of the HardingFPA-X applications have an entry for *Log Filename*. In this box, enter the filename for the text file where you would like the application to store its logging information. This file may be of use if any problems occur, as the log can be checked for unusual circumstances. The *Log Filename* can be at any file location on the system which the application has write permissions to. The *Analyser* has the additional option of selecting a *Logging Verbosity* level *(*which can be seen on the screenshot above). This allows the amount of information logged in the log file to be controlled. It may be useful to increase the *Logging Verbosity* if problems are experienced when running the *Analyser*.

HardingFPA-X Analyser

Note: If, when running on Mac OS X, you see the following error dialog when attempting to run the Analyser, even though the correct HASP key is inserted, please refer to the "HASP Firmware Update" folder on the installation media to update the firmware on the HASP key.

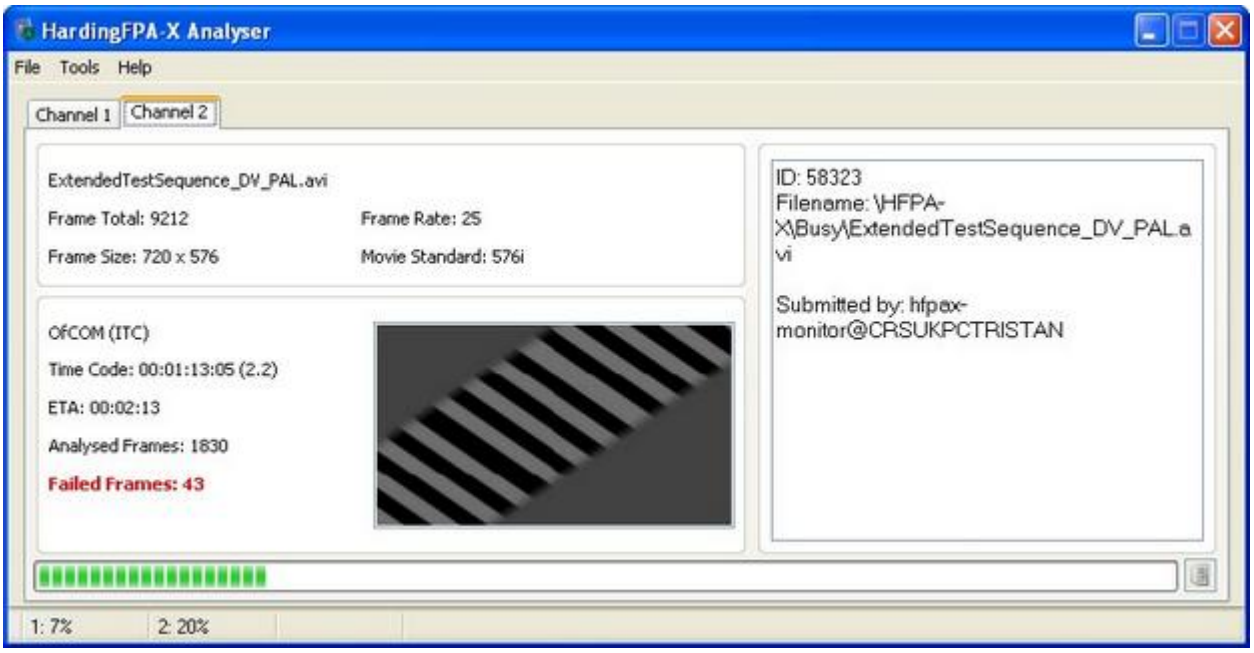


Error dialog that appears when the HASP firmware is out of date

This is the main core of the HardingFPA-X functionality, and is a powerful multi-threaded Flash and Pattern Analyser based on the HardingFPA core with the ability to analyse multiple video clips simultaneously. Depending on your licence, your *Analyser* may support up to four *Channels* simultaneously. If more than four *Channels* are required, an additional *Analyser* instance needs to be licensed and installed on another computer.

Channel 1 is set to exclusively analyse shorter video clips (less than the length set in the *Advanced* section of the *Settings* screen under *Channel 1 Maximum Job Length*). *Channels 2 to 4 (*depending on licence) will therefore analyse jobs longer than this, but may also take shorter jobs if there are no long jobs left in the queue.

When running in two-channel mode, if the value of *Channel 1 Maximum job Length* is set to 0, then only *Channel 2* will receive jobs, effectively making the *Analyser* single channel. If it is set to a very large value, then *Channel 2* will operate in a first-come-first-served basis.



The main HardingFPA-X Analyser interface

The *Analyser* graphical interface above shows the *Analyser* operating in two-channel mode, and therefore shows two identical tabs, one for each of the individual analyser channels, which detail the progress of the jobs currently being analysed. The information displayed on each of these tabs is explained below:

- The top left panel shows the name of the movie file being analysed, the total number of frames in the movie, the frame rate, frame size and movie standard.
- The bottom left panel shows the current state of the job for the selected analyser channel. The length of movie that has currently been analysed is shown, followed by a number in brackets, in the example above 2.2, which gives the current multiple of realtime being achieved by this *Analyser* channel. For example 2.0 would mean that the movies on this *Analyser* core are being analysed two times faster than realtime. In the example, 2.2 refers to 2.2x realtime. *ETA* refers to the estimated time remaining before the job is complete and is only visible when it can be calculated, which may depend on the system and network load. Finally a count of the number of frames that have failed the

guidelines is displayed under *Failed Frames*.

- The panel on the right shows the job ID number and filename of the job. Additionally, any errors or other information used for diagnosing problems is shown in this box. When the *Analyser* is first started, this panel will initially display the version information for the *Analyser,* and its analysis core(s).
- The status bar at the bottom of the window shows the progress of the jobs on each channel.

The correct way to start up the *Analyser* is to start the *Launcher* first and let the *Launcher* start up the *Analyser*, that way the system is protected against unexpected shut down of the *Analyser*.

It is possible to have multiple multi-channel *Analyser*s on the same network to spread the workload and provide greater throughput, provided that they are all configured to connect to the same central database.

The *Settings* screen (shown below, and visible through clicking *Tools -> Settings*), can be used to configure the *Analyser* application. It is here that the number of *Analyser* cores can be set, although your licence will limit how many you may set this to. Some settings changes will require the application to be restarted before the changes take effect.

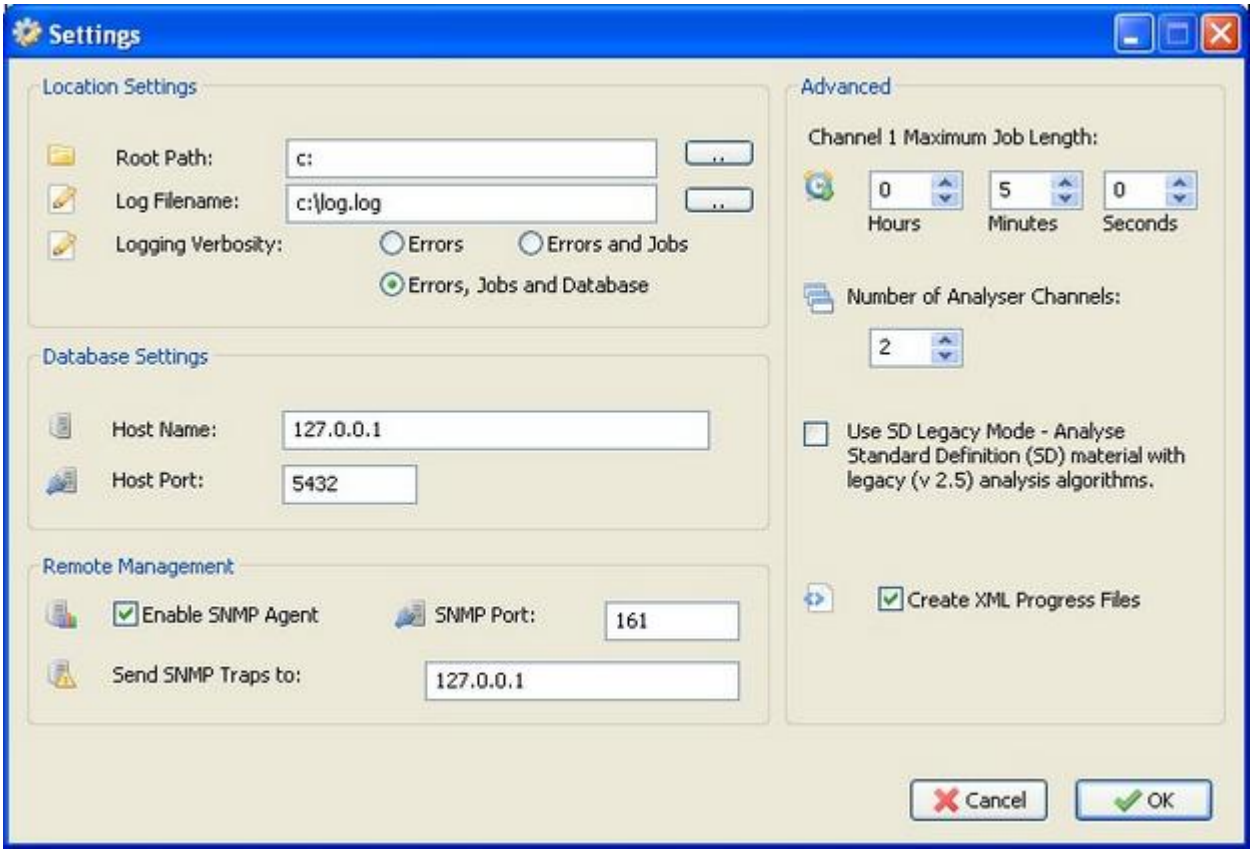
The log verbosity can be set in the Settings screen to one of the following settings:

- *Errors*: Log errors only. This is the same as the default logging setting on previous *HardingFPA-X Analyser* versions.
- *Errors and Jobs*: Log errors but add logging based on what each of the analyser channels is doing with the jobs (opening files, closing jobs, aborting jobs etc).
- *Errors, Jobs and Database*: The same as *Errors and Jobs* but with the addition of logging based on what communication is occurring with the database. This can be useful if unusual effects are noticed that may be the result of problems with the database installation. Note that this setting creates a significantly larger log file than the other settings, because the *Analyser* has continuous communications with the database, so be sure there is enough free disk space for the log file.

The Settings screen is also where the SNMP Agent settings are configured.

This is also where the SD Legacy Mode can be turned on or off.

The checkbox *Create XML Progress Files* can be unchecked if you do not want the *Analyser* to create XML Progress Files during the analysis of jobs.



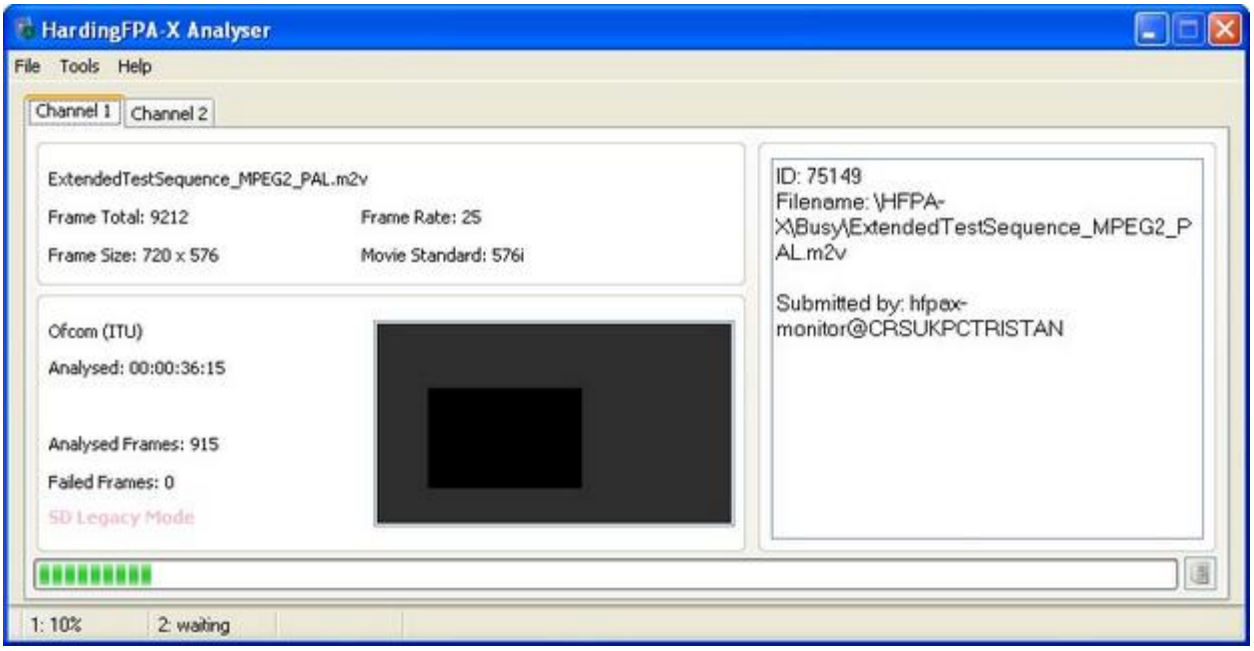
Analyser settings screen

SD Legacy Mode

The *HardingFPA-X* has a version 2.5 legacy analysis option for when comparisons with earlier *HardingFPA* analyses are necessary (i.e. those that have come from versions 1.x of the HardingFPA-X, and to have some level of compatibility with HardingFPA V2.5x SD-SDI Standalone tape-based systems).

If this mode is required it will need to be selected on ***ALL*** *Analysers* in your system.

To select *SD Legacy Mode*, select the *Settings* option on the *Tools* menu of the *Analyser*, check the box to enable *SD Legacy Mode*, and then close and restart the *Analyser* application (via the *Launcher*). Please note, *Legacy Mode* is only available for Standard Definition (SD) video analysis. All HD formats will be analysed with *Version 3 analysis algorithms*. Once the application is restarted, the *Analyser* will only analyse in legacy mode unless the above change is reversed. The *Analyser* will indicate legacy mode analysis in the graph viewed by the *HardingFPA-X* Client applications and on any PDF results certificate, and also on the Job Information on the *Analyser* (see below):



SD Legacy Mode on the HardingFPA-X Analyser

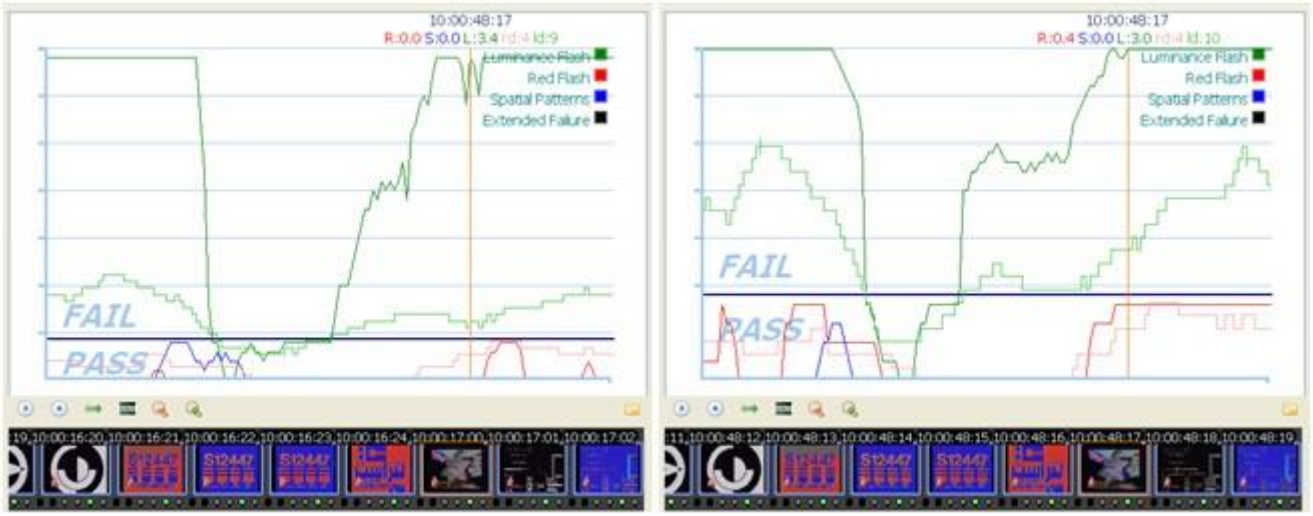
Version 3 Analysis Algorithms

If your system is running *HardingFPA-X Analyser* Version 2.0.0 or above, the analysis now features new analysis algorithms, which are better tuned to High Definition and File-based work.

The Version 3 analysis algorithms are better suited to accomodate subtle changes in the image data, and provide much closer results when testing the same material repurposed either into a different video format, or encoded with a different codec. The main differences between the legacy algorithms and the Version 3 algorithms are detailed below:

Different Graph Scaling

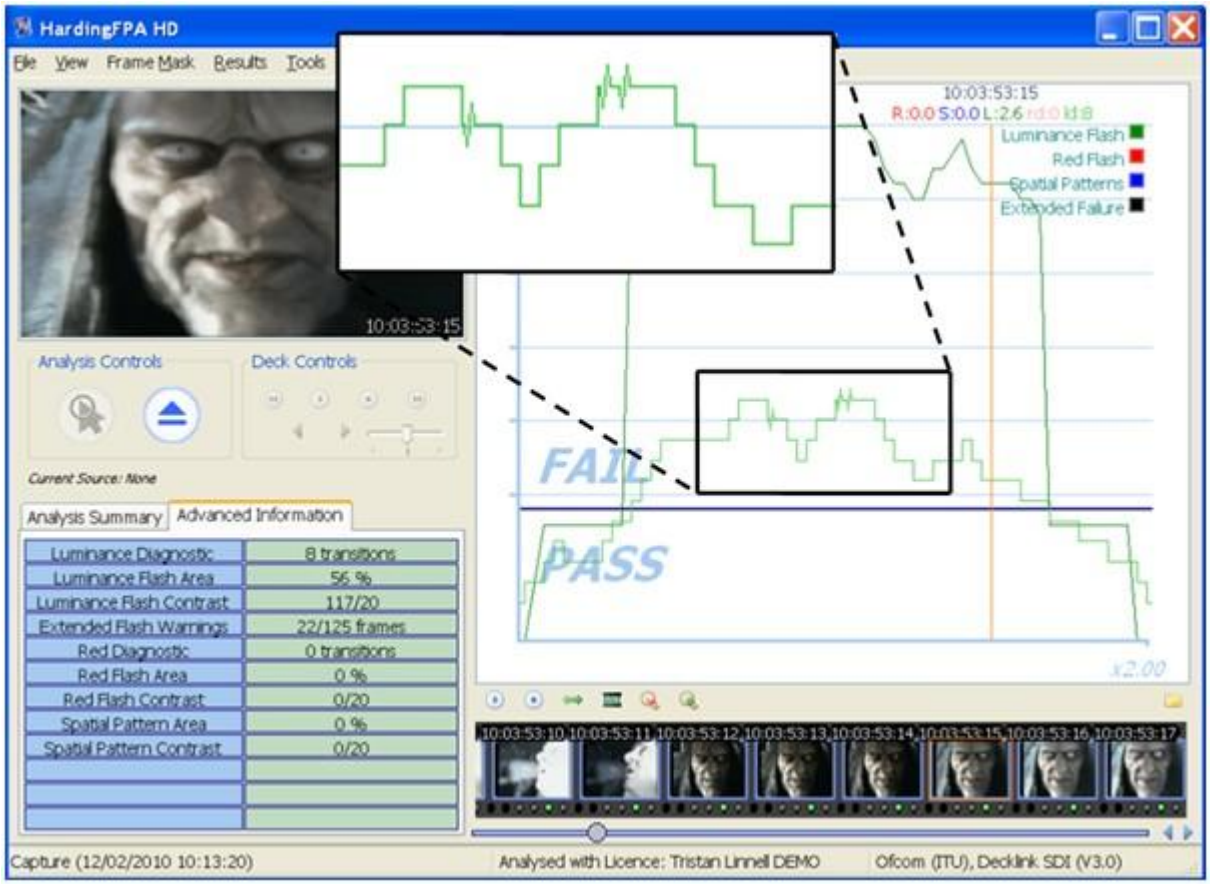
The *HardingFPA-X* generates risk values using the same range as its predecessor (i.e. 0 to 3.4) but displays the graphical data using a revised vertical scale. This modified scale allocates much more vertical space for risk trace warnings and diagnostic trace steps but only displays risk traces up to the value of 3.0. Risk traces values from 3.1 to 3.4 are still logged as part of the results files but are graphically displayed capped at 3.0.



(left) Version 2 and (right) Version 3 Graphing

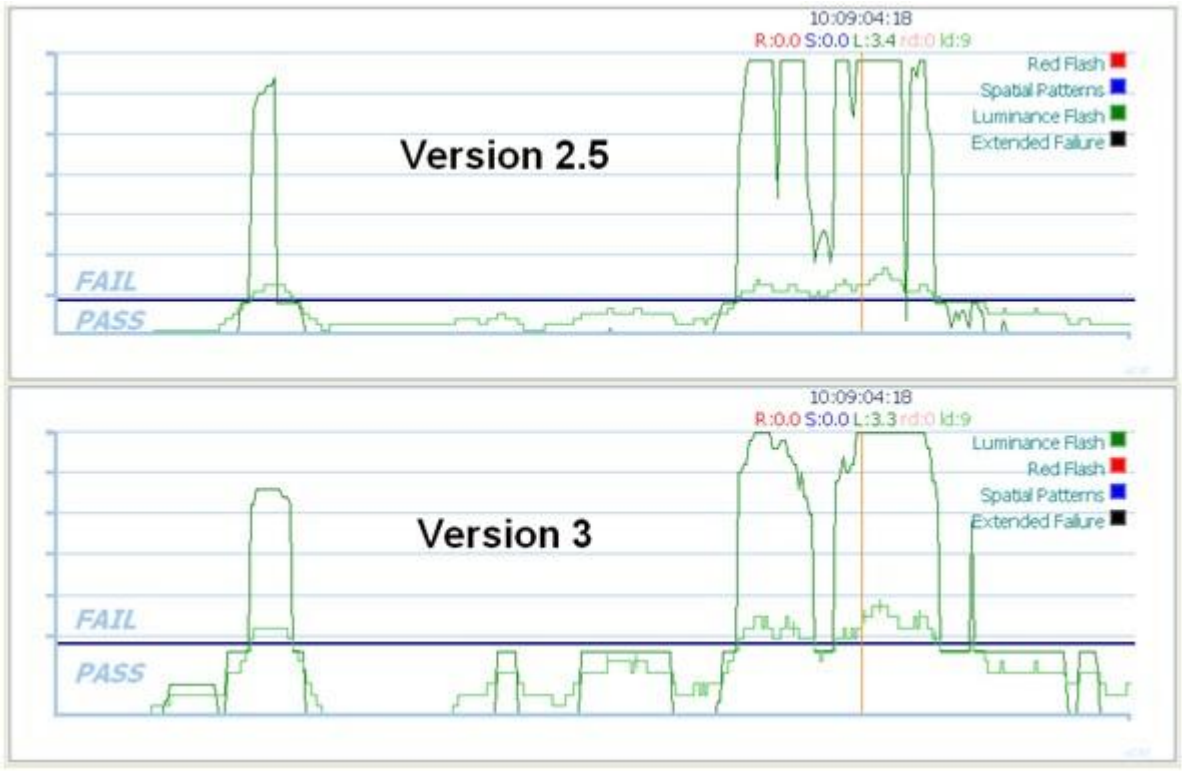
The Squiggle

The *HardingFPA-X* gives enhanced visual diagnostics when an incoming transition coincides with an outgoing transition from one exactly second earlier. The Version 3 algorithms insert a *squiggle* (see below) to indicate when the diagnostic trace has simultaneously gained and lost a transition over the most recent second between video frames.

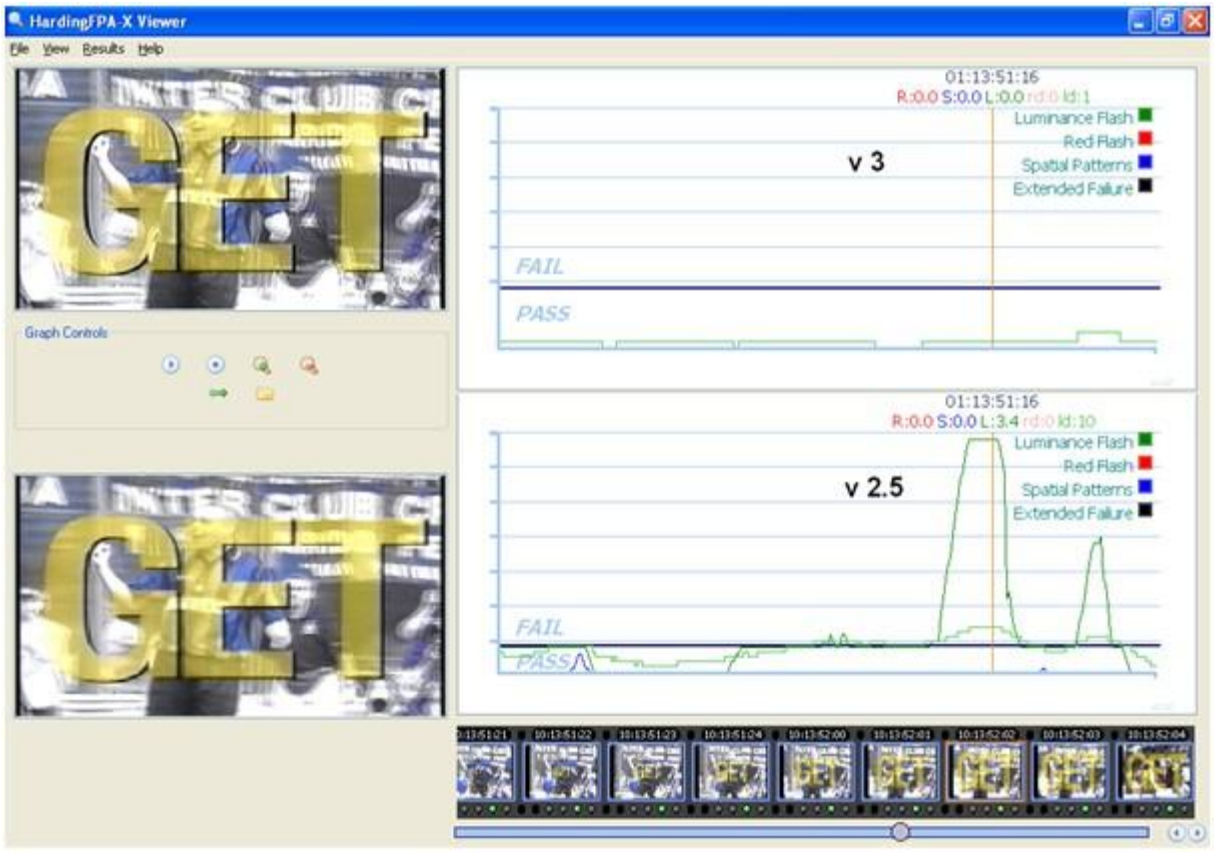


Analysis Results

The Version 3 algorithms give results which are broadly similar to those generated by version 2.5. The figure below shows the results of both versions when analysing the same video input under the same guidelines:



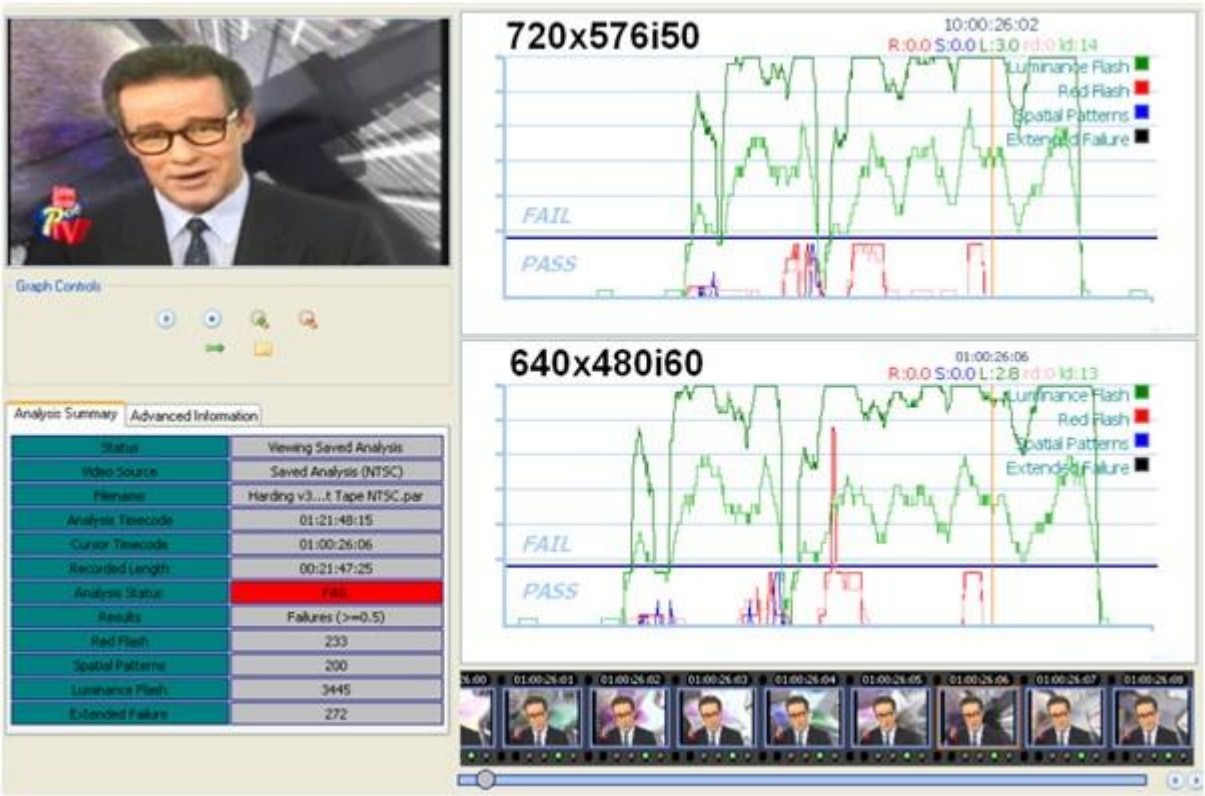
However, the results between the two versions will not be identical. The Version 3 algorithms will, in general, be more slightly more lenient to complex, rapid motion:



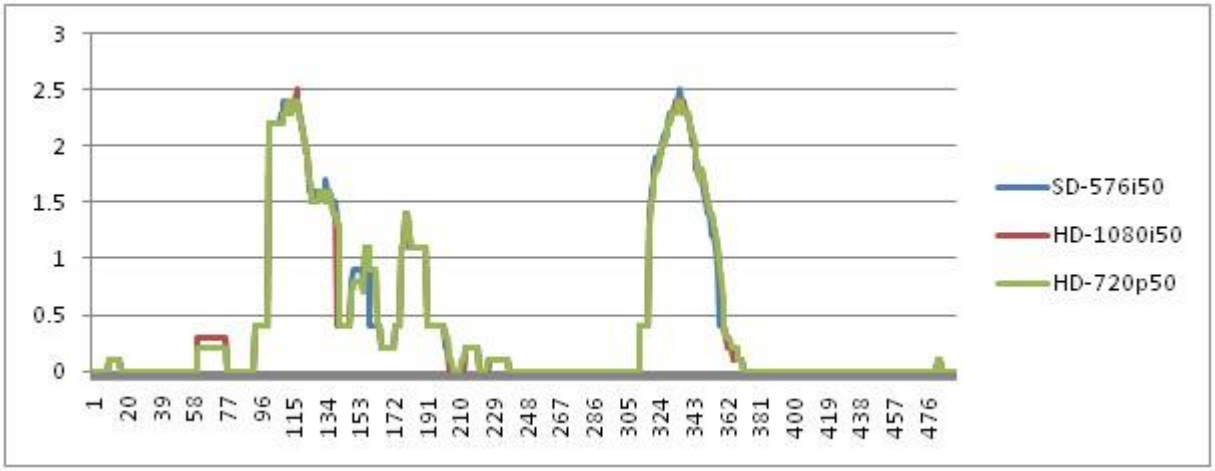
... but more strict to examples of powerful, localised flashing:

Most importantly of all, the Version 3 algorithms have been designed to be as format-agnostic as possible. Changes in file formats or codecs will alter the underlying video data even if these changes are not visually apparent. Here, the same video has been encoded at the same resolution using two different codecs. The absolute differences between the two images are shown in the third image as deviations from mid grey.

The Version 3 algorithms generate highly consistent results from different image resolutions and frame rates. Here, the same movie has been analysed in 720x576i50 and 640x480i60 formats. The only noticeable difference is in the horizontal graph scale due to the different frame rates.



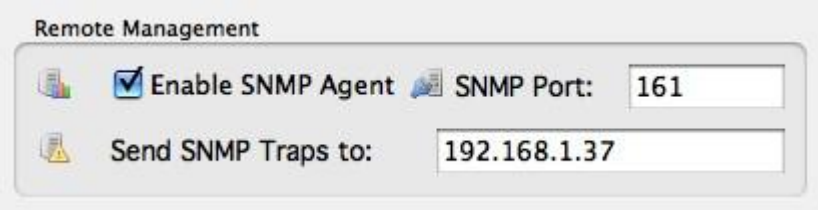
The graph below shows three sets of luminance flash risk results of the same movie analysed in **SD-576i50**, **HD-720p50** and **HD-1080i50** formats, and highlights the considerable similarities in the results:



SNMP Agent

Note that on the Mac platform, you may not be able to use the default SNMP listening port (161) unless the Analyser is being run as the root user. If the status icon (see below) shows an "error whilst binding", this is probably the cause. It is possible to change the port number in the settings.

The Analyser has the option to enable a Simple Network Management Protocol agent (SNMP server) so that you may monitor its operation through a third party SNMP manager. The settings for this can be found on the Settings window of the *Analyser*. Here the SNMP Agent can be turned on or off with the checkbox, the port number to listen on (UDP) can be selected, and (optionally), an IP address or hostname of a network manager to send SNMP Traps to in the event of any errors. All traps are sent to the default port **162**.



The HardingFPA-X Analyser SNMP Agent configuration settings

When the SNMP Agent is active and functioning correctly, the server icon is shown in the bottom right corner of the *Analyser* window, as shown below. In the event of any errors or changes of state, this icon will change. Hover the mouse over the icon to see the status of the SNMP Agent in text.

The SNMP Agent notification icon

MIB:

The Analyser supports the following OIDs from the standard management MIB (.1.3.6.1.2.1.1):

.1.3.6.1.2.1.1.1.0 - sysDescr. The name and operating system of the *Analyser*.

.1.3.6.1.2.1.1.2.0 - sysObjectID The OID for HFPA-X (This is always .1.3.6.1.4.1.33056.1).

.1.3.6.1.2.1.1.3.0 - sysUpTimeInstance The number of 100ths of a second that the SNMP Agent has been active in the *Analyser*.

.1.3.6.1.2.1.1.5.0 - sysName The host name of the computer the *Analyser* is running on.

.1.3.6.1.2.1.1.7.0 - sysServices The sysServices value for the SNMP layer (64).

The HardingFPA-X Products also have a private MIB (the .mib file for which can be found with the installation media, and is reprinted below) to facilitate HardingFPA-X specific management variables and traps. The root of these can be found at:

.1.3.6.1.4.1.33056.1

Please see the MIB for details on what each OID can be used for.

Please note that traps are sent with the community string "HardingFPA-X" in order to facilitate filtering of traps in your management client software.

The HardingFPA-X .mib is duplicated below, in ASN.1:

```
CRS-MIB DEFINITIONS ::= BEGIN

IMPORTS
      OBJECT-TYPE
            FROM RFC-1212
      TRAP-TYPE
            FROM RFC-1215;

cambridgeResearchSystems OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056
      ::= { 1  3  6  1  4  1  33056 }

hfpaX OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1
      ::= { cambridgeResearchSystems 1 }

hfpaXNotifications OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.1
```

```
      ::= { hfpaX 1 }

hfpaAnalyserJobErrorTraps OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.1.1
      ::= { hfpaXNotifications 1 }

hfpaAnalyserJobErrorGeneral TRAP-TYPE
      ENTERPRISE hfpaAnalyserJobErrorTraps
      VARIABLES {
            hfpaAnalyserErrorChannel,
            hfpaAnalyserErrorString}
      DESCRIPTION
            "A DirectShow error occurred during job processing. Error
            string and channel number included"
 ::= 5500

hfpaXObjects OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.2
      ::= { hfpaX 2 }

hfpaXStats OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.2.1
      ::= { hfpaXObjects 1 }

hfpaAnalyserStats OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.2.1.1
      ::= { hfpaXStats 1 }
```

```
hfpaAnalyserchannel1Filename OBJECT-TYPE
      SYNTAX  OCTET STRING
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The filename of the movie file currently being analysed by
            Channel 1"
      -- 1.3.6.1.4.1.33056.1.2.1.1.1
      ::= { hfpaAnalyserStats 1 }

hfpaAnalyserchannel2Filename OBJECT-TYPE
      SYNTAX  OCTET STRING
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The filename of the movie file currently being analysed by
            Channel 2"
      -- 1.3.6.1.4.1.33056.1.2.1.1.2
      ::= { hfpaAnalyserStats 2 }

hfpaAnalyserchannel3Filename OBJECT-TYPE
      SYNTAX  OCTET STRING
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The filename of the movie file currently being analysed by
            Channel 3"
      -- 1.3.6.1.4.1.33056.1.2.1.1.3
```

```
      ::= { hfpaAnalyserStats 3 }

hfpaAnalyserchannel4Filename OBJECT-TYPE
      SYNTAX  OCTET STRING
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The filename of the movie file currently being analysed by
            Channel 4"
      -- 1.3.6.1.4.1.33056.1.2.1.1.4
      ::= { hfpaAnalyserStats 4 }

hfpaAnalyserchannel1Percent OBJECT-TYPE
      SYNTAX  INTEGER (0..100)
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The percentage complete value for the job currently
            on channel 1"
      -- 1.3.6.1.4.1.33056.1.2.1.1.5
      ::= { hfpaAnalyserStats 5 }

hfpaAnalyserchannel2Percent OBJECT-TYPE
      SYNTAX  INTEGER (0..100)
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The percentage complete value for the job currently
```

```
            on channel 2"
      -- 1.3.6.1.4.1.33056.1.2.1.1.6
      ::= { hfpaAnalyserStats 6 }

hfpaAnalyserchannel3Percent OBJECT-TYPE
      SYNTAX  INTEGER (0..100)
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The percentage complete value for the job currently
            on channel 3"
      -- 1.3.6.1.4.1.33056.1.2.1.1.7
      ::= { hfpaAnalyserStats 7 }

hfpaAnalyserchannel4Percent OBJECT-TYPE
      SYNTAX  INTEGER (0..100)
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The percentage complete value for the job currently
            on channel 4"
      -- 1.3.6.1.4.1.33056.1.2.1.1.8
      ::= { hfpaAnalyserStats 8 }

hfpaAnalyserErrors OBJECT IDENTIFIER
      -- 1.3.6.1.4.1.33056.1.2.1.1.5000
      ::= { hfpaAnalyserStats 5000 }
```

```
hfpaAnalyserErrorString OBJECT-TYPE
      SYNTAX  OCTET STRING
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The last error string that occurred. Also sent
            with error traps"
      -- 1.3.6.1.4.1.33056.1.2.1.1.5000.4
      ::= { hfpaAnalyserErrors 2 }


hfpaAnalyserErrorChannel OBJECT-TYPE
      SYNTAX  INTEGER (1..4)
      ACCESS  read-only
      STATUS  optional
      DESCRIPTION
            "The channel number that the last error occurred on. Also sent
            with error traps"
      -- 1.3.6.1.4.1.33056.1.2.1.1.5000.1
      ::= { hfpaAnalyserErrors 1 }
END
```

Results Formats

The *Analyser* is able to produce results of different types, depending on your usage scenario. With the use of the *Monitor* application or XML token file job submission, the different types of results files can also be placed in different folders. The avilable results types are explained in this section.

PAP/PAR/PAM Results

These are proprietary CRS HardingFPA Results files, which contain numerical (PAR), pictorial (PAP) and Frame Mask (PAM) details of the analysis outcome. These can be viewed using the *HardingFPA-X Viewer* application.

PDF Results

A PDF certificate showing the overall pass or fail status. Fail reports can also be set up to provide additional diagnostic information, including the identification of failure regions with thumbnails. the PDF format is the same as those obtained from other HardingFPA applications.

CSV Results

Comma Separated Variables of the raw data from the analysis. This can be used for more advanced set-ups, should you require access to the raw data relating to the results traces. The file is presented as follows:

```
"HH:MM:SS:FF", "Flash", "Red", "Spatial", "Extended", "FlashDiag", "RedDiag"
"00:00:00:00", 0, 0, 0, 0, 0, 0
"00:00:00:01", 0, 0, 0, 0, 0, 0
"00:00:00:02", 0, 0, 0, 0, 0, 1
"00:00:00:03", 0, 0, 0, 0, 0, 1
"00:00:00:04", 0, 0, 0, 0, 0, 1
"00:00:00:05", 0, 0, 0, 0, 0, 0
"00:00:00:06", 0, 0, 0, 0, 2, 1
"00:00:00:07", 0, 0, 1, 0, 2, 0
"00:00:00:08", 0, 0, 2, 0, 2, 2
"00:00:00:09", 0, 0, 2, 0, 2, 1
… etc.
```

XML Results

This is another way of obtaining the raw results data for the analysis, this time in eXtensible Markup Language. This file contains more information than the CSV format. All of the fields available from the PAR file (viewed using the *Viewer*) are stored in the XML results file. Please refer to the ***HardingFPA-X System User's Manual*** for detailed information on the result fields. The layout of this file is as follows:

```
<?xml version="1.0" ?>
 <fpasvc>
        <header>
       <fpasvc version="HardingFPA-X Analyser 2.0.0" />
      <file name="test.mov" assetnumber="as12345" />
      <video framerate="25.00" width="720" height="576" />
      <analysis totalframes="00:00:40:24" />
      <analysis endframe="00:00:40:24" />
      </header>
   <summary analyser="HardingFPAX" version="2115" analysis_standard="OfCOM (ITC)" mode="PAL"
scan="Interlaced"  format="UYUV" status="Failed" error="">
      <item type="luminanceflash" count="54"  warnings="559"/>
      <item type="redflash" count="5"  warnings="57"/>
      <item type="spatialpattern" count="0"  warnings="7"/ />
      <item type="extended" count="0" />
      </summary>
   <results>
```

```
        <failsequence startframe="00:00:10:19">
                <failure timecode="00:00:10:19" flash="0.5" red="0.0" spatial="0.0" extended="0" reddiag="7"
flashdiag="7"/>
                <failure timecode="00:00:10:20" flash="0.7" red="0.0" spatial="0.0" extended="0"  reddiag="7"
flashdiag="7"/>
                <warning timecode="00:00:10:21" flash="0.9" red="0.0" spatial="0.0" extended="0"  reddiag="7"
flashdiag="7"/>
                <warning timecode="00:00:10:22" flash="1.1" red="0.0" spatial="0.0" extended="0"  reddiag="7"
flashdiag="7"/>

                ... etc, for each of the data points in the current failure/warning region sequence.

        </failsequence>

        <failsequence startframe="00:00:20:05">
            ... Repeats as before. One section of this type for each failure/warning region sequence...
        </failsequence>
        </results>
  </fpasvc>
```

Note that warnings will only appear in the XML Results files if this option was selected when the job was submitted (using the *Monitor* application).

XML Progress File

As jobs are being analysed, their progress can be tracked in an external automation system by reading from the *progress file.* In order to allow for the creation of these files, this option must be enabled in the *Settings* screen of the *HardingFPA-X Analyser*. The file name will consist of the Job ID, followed by the movie filename, and with the string '_progress' appended to the name. The contents of the file are in the following format:

```
<?xml version="1.0" ?>
<hfpax>
   <header>
      <analyser version="1.3.0" />
      <file name="/Users/tristan/hfpax/busy/testsequence2_xvid.avi" assetnumber="as12345"  />
      <video framerate="25.00" width="720" height="576" />
      <analysis startframe="00:00:00:00" endframe="00:02:14:13" />
   </header>
   <status value="complete" position="00:02:14:13" progress="100" />
</hfpax>
```

The *status* tag in the example above indicates that the file has been analysed. The 'progress' attribute indicates the percentage of the file that has been analysed.

The possible values of status are:

1. *busy*, the file is being analysed.
2. *complete*, analysis has successfully been completed. This does not indicate that the movie has passed.
3. *aborted*, the file analysis has been aborted.
4. *error*, there was an error during the analysis.

The *position* attribute in the *status* tag details the position of the analysis at the current time, or at the position of the error in the case of the error state. In the case of the *error* status, an additional tag is included with the error details e.g. < error code ="**4**" message="**QT ERROR 4: Visual context error**"/>, which appears under the *status* tag. Error numbers below 100 indicate the there was a problem with the movie file, and numbers above 100 indicate that there was an error with the analysis engine.

Other information contained within the progress file includes the analyser version, filename, frame rate, frame width and height etc. as well as an optional assetnumber field, which is specified if the job was submitted using an XML Token File with an Asset Number specified.

HardingFPA-X Monitor

This application is required if you require the use of *Watch Folders* or *XML Token Files* to submit jobs to the system. To use *Watch Folders*, a user simply moves or copies files to be analysed into a pre-designated input folder. The *Monitor* then identifies the job, moves it into a busy folder and submits the job to the *Analyser*.

This process can be easily automated in a more complex set-up. Options exist to move jobs to different folders depending on their pass/fail status, and support is given for multiple watch folders via wildcard search patterns or lists of folders. The *XML Token File* is an XML file which can be used to specify the parameters for a specific job, which are interpreted by the *Monitor* which then schedules the corresponding job.

The *Monitor* will submit movies as long as it has read/write permissions to them, and they have one of the following file extensions:

mov, dv, avi, wmv, vob, mpg, mpeg, xml, mxf, mp4, m2v, flv.

Note however that even if the *Monitor* successfully submits the job, the *Analyser*(*s*) in the system must have the appropriate codec correctly installed and configured in order to be able to analyse it.

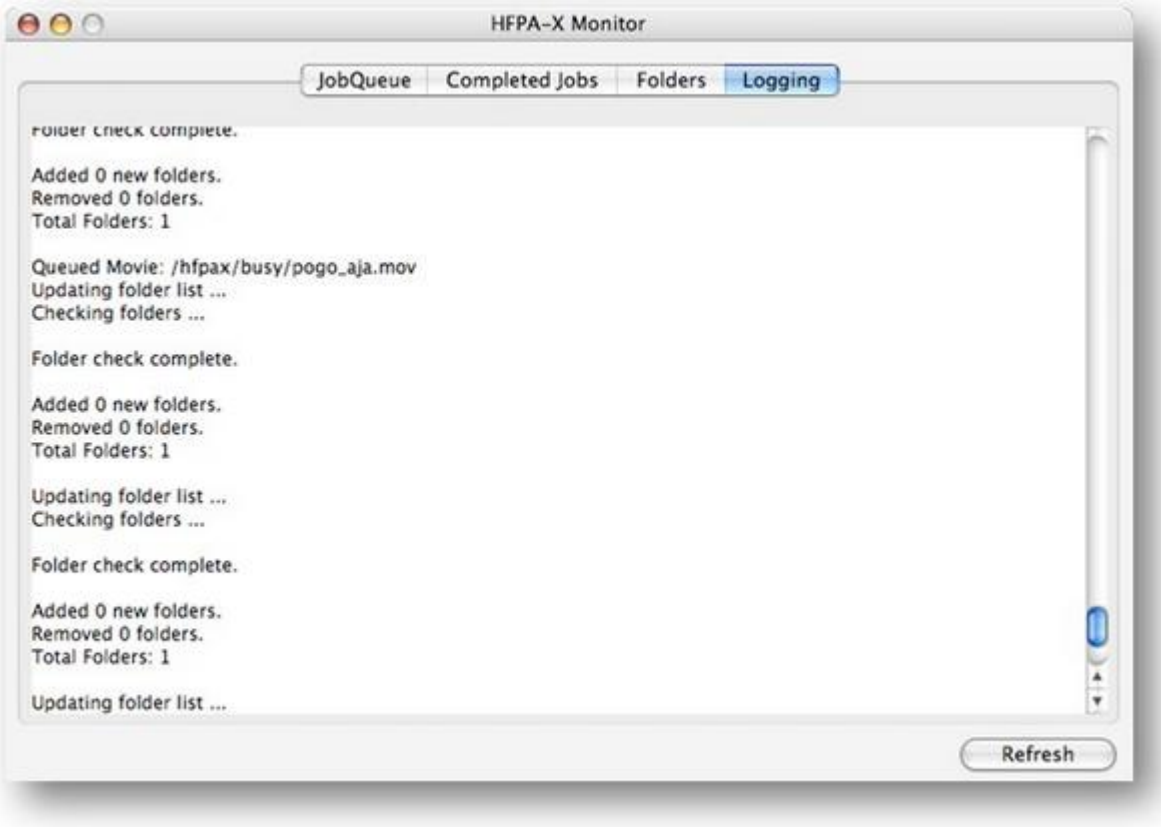
Tabs

The *Monitor* application features the following tabs:

The *Job Queue* and *Completed Jobs* tabs show the current jobs being analysed and waiting (*Job Queue*) and the jobs that have been analysed in the last 14 days (*Completed Jobs*). Please note that it is not possible to manipulate the *Job Queue* or view results via the *Monitor* application. The tabs here are for information only.

The *Folders* tab shows a list of all folders currently being watched by the *Monitor*. Movies that are copied or moved into these folders will automatically be entered into the job queue for analysis as soon as possible.

The *Logging* tab shows a log of activity performed by the *Monitor* including adding watch folders, queuing jobs, re-queuing jobs and any errors that occur. If any problems occur with the watch folder functionality, remember to check here for any unusual error messages.



Monitor logging screen

Watch Folder Settings

This section defines the locations of the various folders used in the HardingFPA-X system, inlcuding the Watch Folders that the *Monitor* application collects jobs from.

The process is that movie files that are placed in the *Movie Input* folder are moved by the *Monitor* to the *Busy* folder as soon as they are placed into the job queue, and are then moved to either *Movie Passed* or *Movie Failed,* depending on whether they pass or fail the analysis. The different results types are then placed in the relevant *Results* folders.

Standard Watch Folder Operation Mode

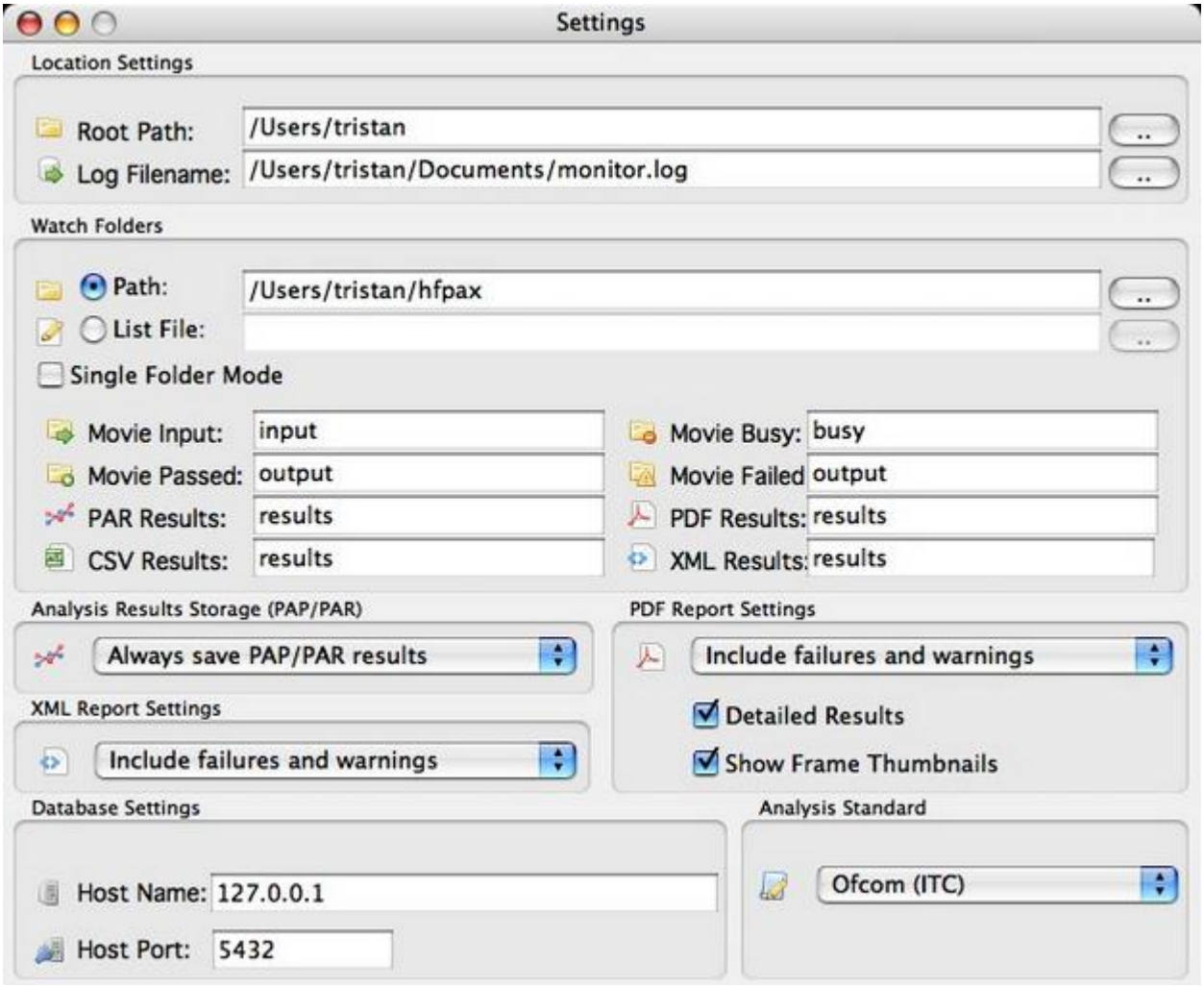
These instructions are for the conventional watch folder mode, where material is to be dropped/copied to an input folder, then moved to a busy folder during analysis, and later moved to output folders based on analysis result.

Path: This is the root folder, underneath which all of the following sub-folders are to be found. It is also possible to include wildcards in this path in order to have multiple watched folders.

Note that all of these multiple watch folders must have the same subfolder structure underneath them.

For example if the *Path* was set to /movies/test*, then the application will operate on the input, busy and output subfolders of all of the folders that match the wildcard, in this case the folders that start with /movies/test. For example /movies/test1, /movies/test2, /movies/test3 etc, all of which should be configured to contain the same pattern of subfolders for input, output and results.

List File: This is another way of specifying multiple watched folders. This path should specify a text file which contains each watch folder path on its own line of the file. The *Monitor* will then add these folders to the list of watch folders. Note the *Monitor* will expect to find the same subfolder structure (input, busy, output etc.) in each of the eatch folders.



Monitor settings screen

The purpose of each subfolder is as follows:

Movie Input: Where the *Monitor* should look for movie files to be analysed. Movie files can be moved or copied into this folder by users who wish to have the files analysed by the HardingFPA-X System.

Movie Passed: Where the *Monitor* moves any movie files that pass (after analysis is complete).

PAR Results: Where the PAP/PAR/PAM results files (that are used by the *Viewer* application) should be saved to when the analysis is complete.

CSV Results: Where the CSV results files are saved to after the analysis is complete.

Movie Busy: Where the *Monitor* moves the movie files to after they are added to the job queue.

Movie Failed: Where the *Monitor* moves any movie files that fail (after analysis is complete).

PDF Results: Where the PDF results files are to be saved after the analysis is complete.

XML Results: Where the XML results files are to be saved after the analysis is complete.

In the *Analysis Standard* section, the analysis standard which all jobs submitted by this *Monitor* application will be analysed as can be set. Please note that the *Analyser*s that pick up these jobs need to be licensed to analyse the standard that is chosen; therefore the HASP key in use on the *Analyser* computer must have the relevant guidelines licensed. Please contact Cambridge Research Systems if you require additional analysis standards.

Single Watch Folder Operation Mode

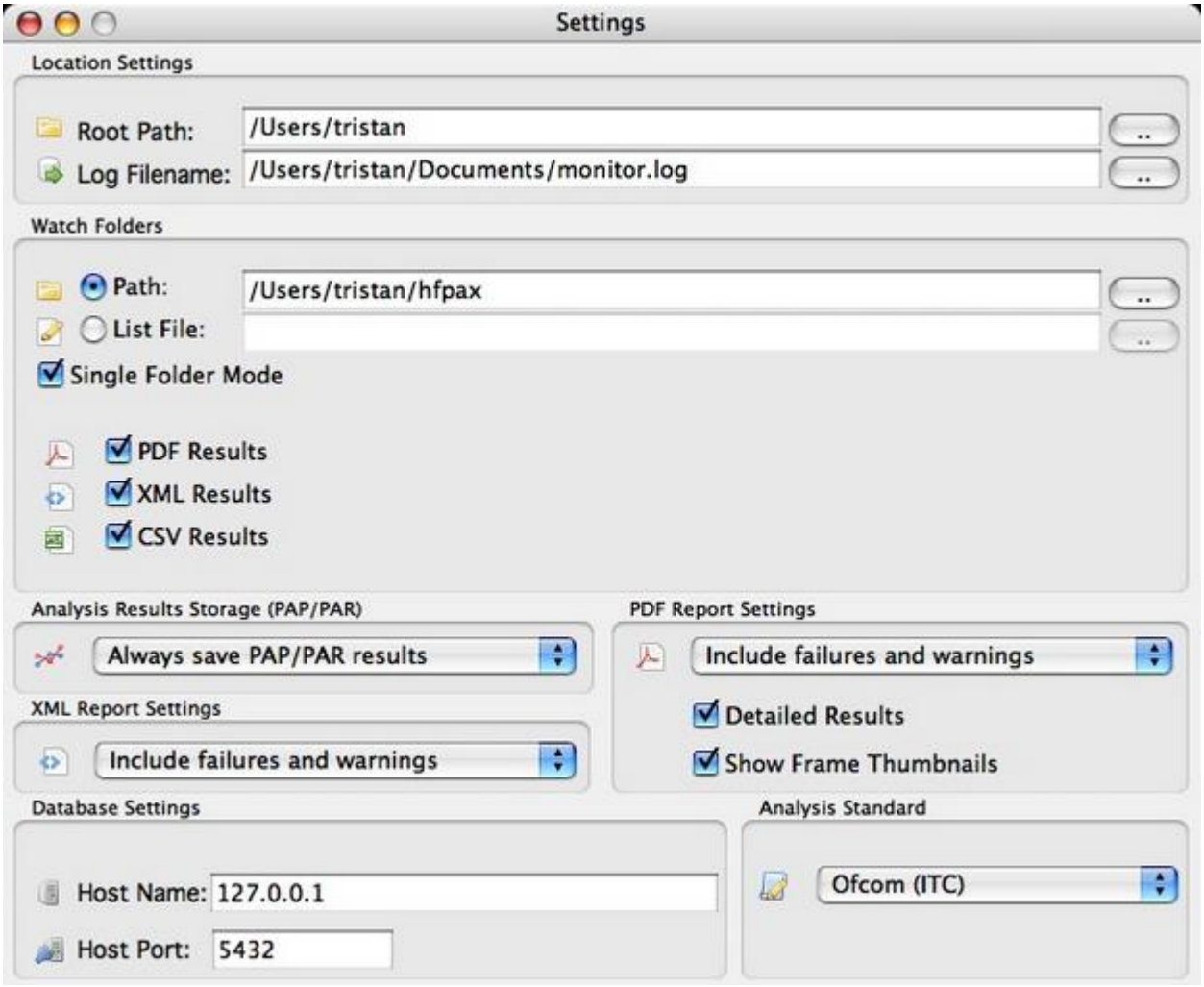
If required, it is possible to put the *HardingFPA-X Monitor* into Single Folder Operation Mode, whereby all assets including source files to be analysed and results files (PAP, PAR, CSV, XML etc.) are all stored in the same watch folder.

To enable this mode, select the *Single Folder Mode* checkbox.

Please note that whilst operating in this mode, the Job ID number is ***not*** prepended to the start of the filenames for the results or progress files.

Due to the fact that the movie assets will not be moved during and after analysis, the *Monitor* will not requeue a job in the single watch folder if at least one results file corresponding to the file in question is present. If these results files are deleted or moved out of the single watch folder, then the file will be requeued.

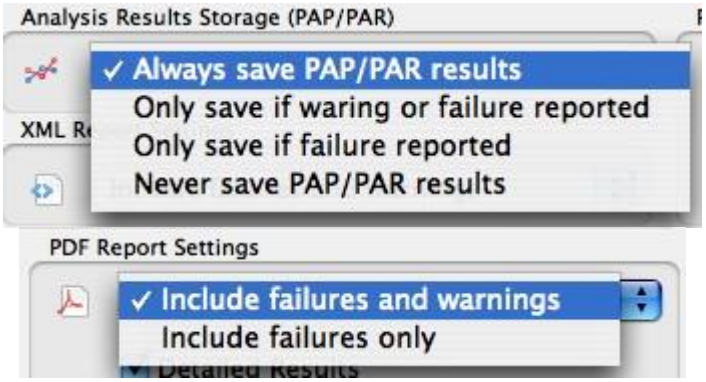
The screenshot below shows an example settings screen for using a single watch folder.

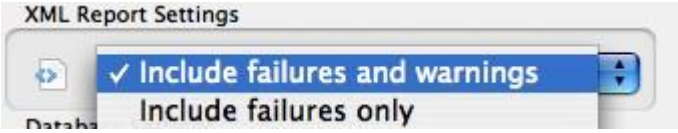


Monitor Single Watch Folder Operation Mode

Results Output Settings:

Below the watch folder settings there are some drop down boxes to select the criteria for generating the different results files, as shown below, as well as options for inclusion of detailed results and/or thumbnails in the PDF certificate:





Advanced XML Results Configuration:

Should you require that a specific string be appended to the end of the filename for the XML results files, you can configure this by adding a string value to the Windows registry / Mac ini file as follows:

Windows:

Add a string key `XML_Append`:

```
HKEY_LOCAL_MACHINE\SOFTWARE\Cambridge Research
Systems\HFPAXAnalyser\XML_Append
```

Mac:

In the file */Library/Preferences/com.crsltd.hfpaxlicenceserver.ini*

Add a string to the `[SETTINGS]` section:

```
XML_Append = _results
```

The string contained for this key/value is then appended to the XML results filename. For example if *"_results"* is placed into the string, the XML filename would appear as below:

MovieName_results.xml

XML Token File

The XML Token File is an advanced way of submitting jobs to the HardingFPA-X System. The parameters for the job to be submitted are entered into an XML "token file", which is then copied to an 'input' watch folder. The *Monitor* application processes the token and subsequently sets up a job according to its contents and submits it to the *Job Queue*.

The format of this file and an example is shown below (with default attribute values):

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<hfpaxjob>
        <priority>0</priority>
        <file assetnumber="as12345">/Users/tristan/Movies/test.mov</file>
```

```
        <locations>
                <output jobid="1">/Users/shared/Output/</output>
                <pappar jobid="1" storage="always">/Users/shared/Results/PAPPAR</pappar>
                <pdf jobid="1"   content="all"   detailed="1"
thumbnails="1">/Users/shared/Results/PDF</pdf>
                <csv jobid="1" storage="always">/Users/shared/Results/CSV</csv>

                <xml jobid="1"   content="all">/Users/shared/Results/XML</xml>
        </locations>
</hfpaxjob>
```

In this file the job's priority value is given as the priority field and can take a value of between -10 and 10, where 0 is standard priority and is also the default value if no priority is given. Values greater than 10 or less than -10 will be capped to 10 or -10.

The movie file location is specified in the <file> tag *(/Users/tristan/Movies/test.mov*), with an optional Asset Number specified in ***assetnumber***. The Asset Number allows you to better integrate with automation systems by providing a reference to the movie that you may track. The Asset Number is a string (i.e. can contain letters as well as numbers) and is written to XML Progress files, XML Results files and also the PDF certificate Results files.

Next is the *locations* section, which describes the destinations of the results files. These are all optional, and results of the corresponding type will only be output if there is a path present in the relevant section. The first field in each of these, ***jobid***, should be set to "**1**" if you require the Job ID number of the job to be prepended to the results file, e.g. *00059test.pdf,* and to "**0**" if this is not required, e.g. *test.pdf*.

The results directories are described by the following sections:

- *<output>* Move the movie file into the following folder.
- *<csv>* Create CSV Results in the following folder.
    - In this option, "*storage*" can be set to specify when the CSV results are to be saved: "*always*" to always save, "*warning*" to only save when a warning or failure occurs, "*failure*" to only save when the material fails, and "*never*" to never save CSV results.
- *<pappar>* Create PAP/PAR/PAM Results in the following folder.
    - In this option, "*storage*" can be set to specify when the PAP/PAR/PAM results are to be saved: "*always*" to always save, "*warning*" to only save when a warning or failure occurs, "*failure*" to only save when the material fails, and "*never*" to never save PAP/PAR/PAM results.
- *<pdf>* Create PDF Results in the following folder.
    - In this option, "*content*" can be set to specify which details are saved to the PDF certificate produced for this job: "*all*" to save warnings and failure information, or "*failures*" to only save failure information.
    - To show details of all failed frames in the PDF certificate, set "*detailed*" to 1, otherwise set to 0 (where the start and end frames of a warning/fail sequence are reported).

  - To show thumbnail images in the PDF certificate, set "*thumbnails*" to 1, otherwise set to 0.

- *<xml>* Create XML Results in the following folder.

  - In this option, "*content*" can be set to specify what details are saved to the XML results file produced for this job: "*all*" to save warnings and failure information, or "*failures*" to only save failure information.

HardingFPA-X Licence Server

The *Licence Server* maintains a list of all of the computers that are allowed to use the *Submit* and *Viewer* parts of the client distribution. Upon starting up, the *Viewer* and *Submit* applications will contact the *Licence Server* in order to request permission to operate. The *Licence Server* will then reply with permission, provided the client computer is registered. The *Licence Server* requires a HASP USB dongle with the Licence Server feature enabled on it.

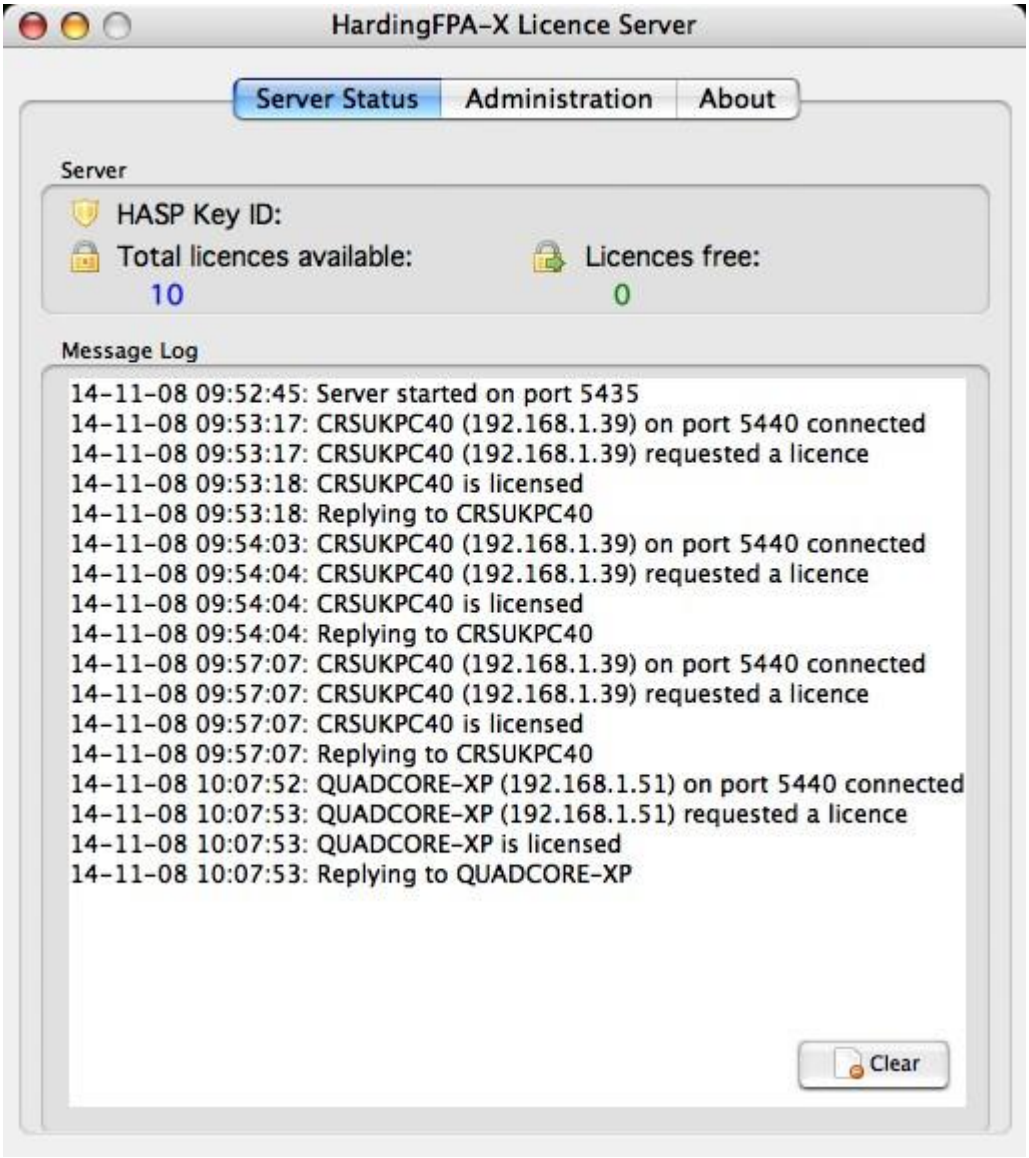
Client computers are licensed by a unique Identifier field, whch is calculated by each client. The Identifer will remain constant for a particular computer under normal circumstances, although some actions, for instance reinstalling the operating system or adding/changing computer hardware, may cause it to change. If the Identifiers change for any reason, you will need to use a De-Registration to alter the record in the Administration tab.

The client applications do not need to be pre-configured with respect to the whereabouts of the *Licence Server* (i.e. its IP address). The client applications will automatically determine this on start-up. This is only possible if the clients and the *Licence Server* are on the same subnet (see System Requirements). If you need to run clients on different subnets, you may need to utilise *Manual Licence Server Location Mode*.

Server Status

The main *Server Status* tab (shown below) shows the total number of licences that have been purchased with your copy of the HardingFPA-X System. This means that only this number of computers is allowed to utilise the client applications. Any unlicensed computers will not be allowed to run the *Submit* or *Viewer* applications. This tab additionally shows the number of free licences currently available, i.e. the number of spaces left for the client's Identifier field to be registered.

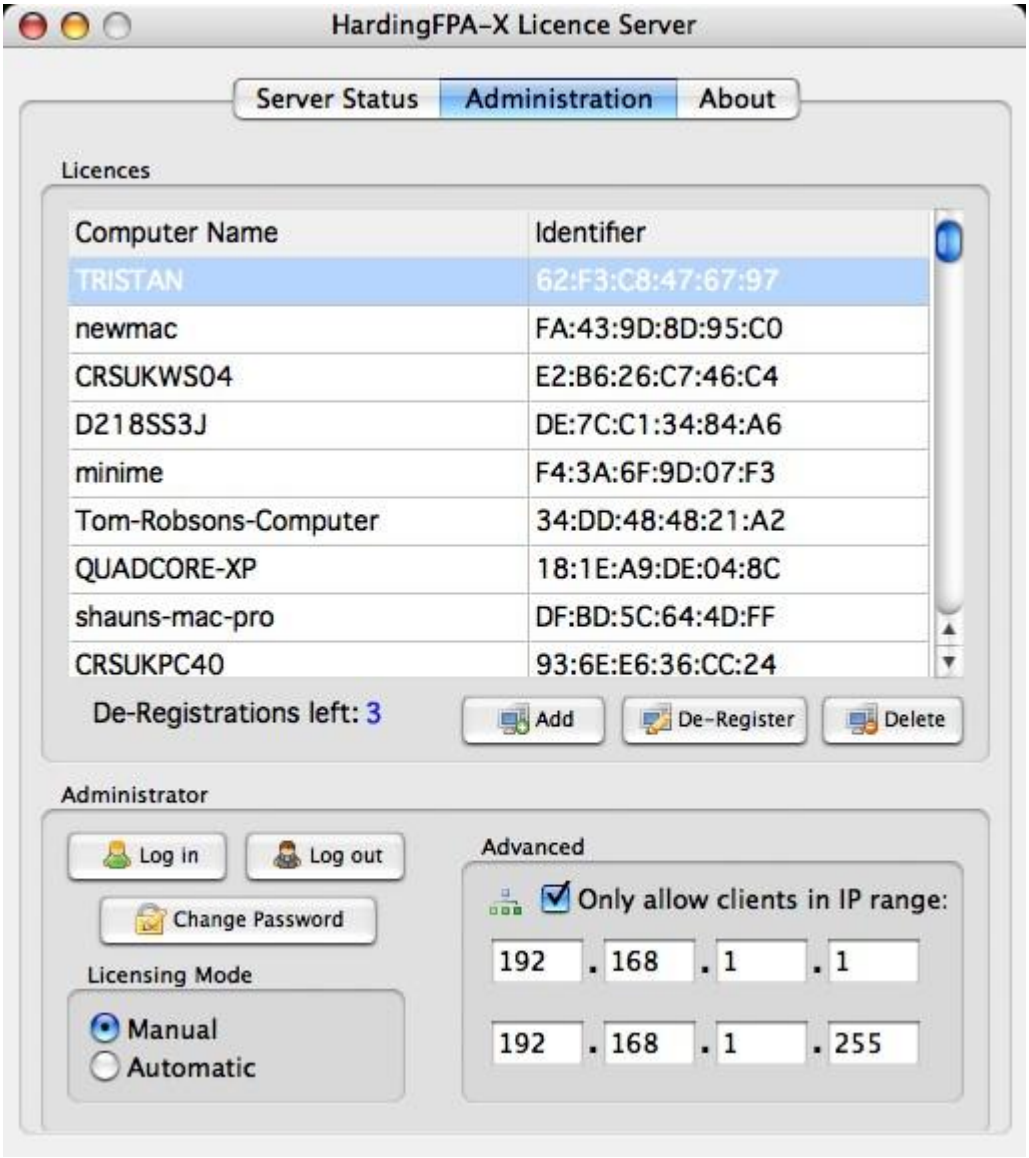
The *Message Log* panel shows log messages that may be helpful for diagnosing problems and for monitoring the status of the *Licence Server*. Messages are shown here whenever client computers connect and request licences. Any problems or errors will be logged here. Should any problems be encountered with the licensing system, this is the first place to check what may have caused the issues. The *Message Log* can be cleared for ease of reading by clicking on the *Clear* button.



Licence Server main tab

Administration

The *Administration* tab allows you to register and de-register client computers from the system and to specify a range of IP addresses from which to accept connections. The administrator must first of all log in using the Administrator's password, which defaults to "*password*" unless otherwise specified. This password can and should be changed by clicking on *Change Password*. Be aware that if this password is forgotten it will be impossible to log in and change it and the HASP key will need to be reset (this can only be performed by Cambridge Research Systems Ltd. (CRS). Please contact CRS for more details).

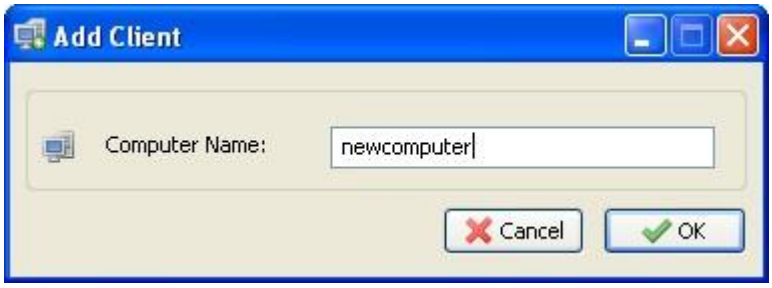


Licence Server administration tab

Registering Clients

The administrator must register the client computers after logging in to the Administration tab. There are two licensing schemes that may be used with the *Licence Server*:

Manual Licensing Mode – In this mode, each client that is allowed to connect must have its host name added manually to the list of allowed clients. In order to do this, click the *Add* button and enter the host name of the computer you wish to register.



If you make a mistake and need to change a host name, this may be done by double-clicking on the host name in question. If a computer connects that has changed its name, the name for the computer's Identifier will not be automatically updated, but can be updated by logging in as the administrator and double clicking on the relevant computer name.

Automatic Licensing Mode – In this mode, every time a computer connects it will now be automatically added to the list of licences, provided there are licences remaining. Beware that if computers connect that you did not expect to connect, they will be registered and you will have to use one of a limited number of *deregistration*s to remove it. If a computer connects that has changed its name, the name for the computer's Identifier will be automatically updated.

If for some reason the configuration information for the *Licence Server* gets deleted (if you reinstall your server for instance), you may be left with some "floating" Identifiers in the Administration tab. These can still be used by either activating *Automatic Licensing Mode* or by double clicking and entering the host names manually. You do not need to use up any deregistrations.

Deregistrations

Depending on the number of licences you have purchased for your HardingFPA-X System, the administrator will be allowed to "*deregister*" or "*delete*" a number of registered Identifiers in a week-long period. The greater the number of licences you have, the greater this number is. You can work out how many deregistrations to expect by using the following formula:

Number of Deregistrations = (Number Of Licences / 10) + 2

up to a ***maximum*** of 25 deregistrations.

The number of deregistrations remaining is shown on the Administration tab.

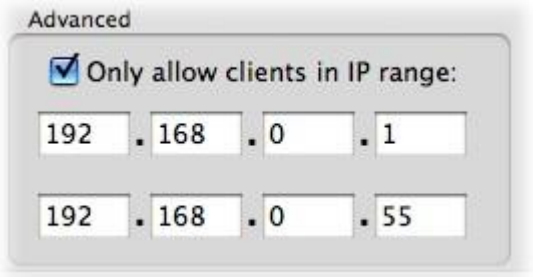
DeRegister will remove the computer's Identifier and leave the hostname. To deregister a computer, highlight the relevant row and click *DeRegister*. The process can take a few seconds as the licensing system uses the HASP memory extensively.

Delete will remove the entire record, i.e. the hostname and Identifier. To delete a computer, highlight the relevant row and click *Delete*. The process can take a few seconds as the licensing system uses the HASP memory extensively.

If you only need to change the hostname of a computer that has already been registered, you may double click the hostname in the table and edit the hostname.

IP Address Range

The Administration tab has the additional option of specifying a range of IP addresses from which to accept incoming connections from clients. In ordinary use this is not required, but in the case of some custom installations where multiple *Licence Servers* are running on the same network, this is a requirement to avoid interference between the servers.



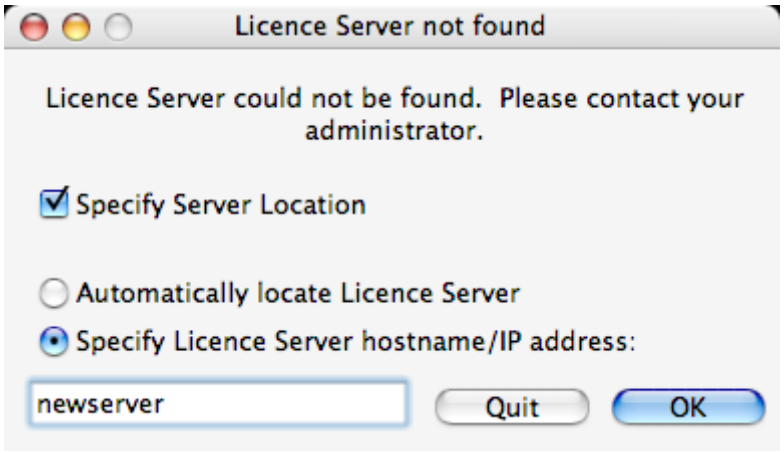
Specifying IP address range in the Licence Server

To enable this feature, log in using the administrator password and check the box "*Only allow clients in IP range*" in the *Advanced* section. You may then enter the IP addresses at the start and end (inclusive) of the required range in the boxes below. Enter the start address in the top set of boxes, and the end address in the bottom set of boxes as shown above.

Manual Licence Server Location Mode

In order to specify the address of the *Licence Server* to the client computers, you may enable this mode by creating a simple configuration file which the client applications (*Submit* and *Viewer*) will check for on start-up.

The *Submit* and *Viewer* applications will automatically prompt the user for this information if the *Licence Server* cannot be found using the current settings (either automatic or specified). Once the user enters this information, the *ini* file will be written (if the user has the correct permissions).



User assisted Manual Licence Server Location Mode (HardingFPA-X Client applications)

If the application finds the configuration file then it will use the IP address or hostname specified within as the *Licence Server* address, otherwise it will revert to automatic server location. The location of this file is dependent on the operating system of the *client* systems. The following examples are to specify an address of *192.168.0.1*. Replace this IP address with that of your *Licence Server,* or its hostname:

- Mac OS X:
  - Create the file */Users/USERNAME/Library/Preferences/com.crsltd.hfpaxlicenceserver.ini*
  - If this file already exists, add the following lines to it, otherwise create the file with the following lines only:

```
[LICENCE_SERVER]

Address=192.168.0.1
```

- Windows:
  - On Windows, a registry key is used instead....

```
[HKEY_CURRENT_USER\SOFTWARE\Cambridge Research Systems\HFPAXLicenceServer]

"Address"="192.168.0.1"
```

Be aware that if the Licence Server Location Mode configuration file does not specify an IP address where a HardingFPA-X *Licence Server* is running, then it will appear as though the client cannot access the *Licence Server*.

HardingFPA-X Supervisor

This is a tool for the exclusive use of the system administrator, and can be run from as many computers as it is installed on. The *Supervisor* application allows jobs that are currently in the job queue, or currently being analysed, to have their priorities modified, or for the jobs to be aborted. On start-up, the *Supervisor Password* must be entered to gain control of the database. The default password here is "***adminhfpax***".

Please note that this password is specific to the database installation, and is ***not*** the same password as the *Administrator Password* in the *Licence Server*. It is recommended to change the *Supervisor Password* as soon as possible by selecting *Tools → Change Supervisor Password*.

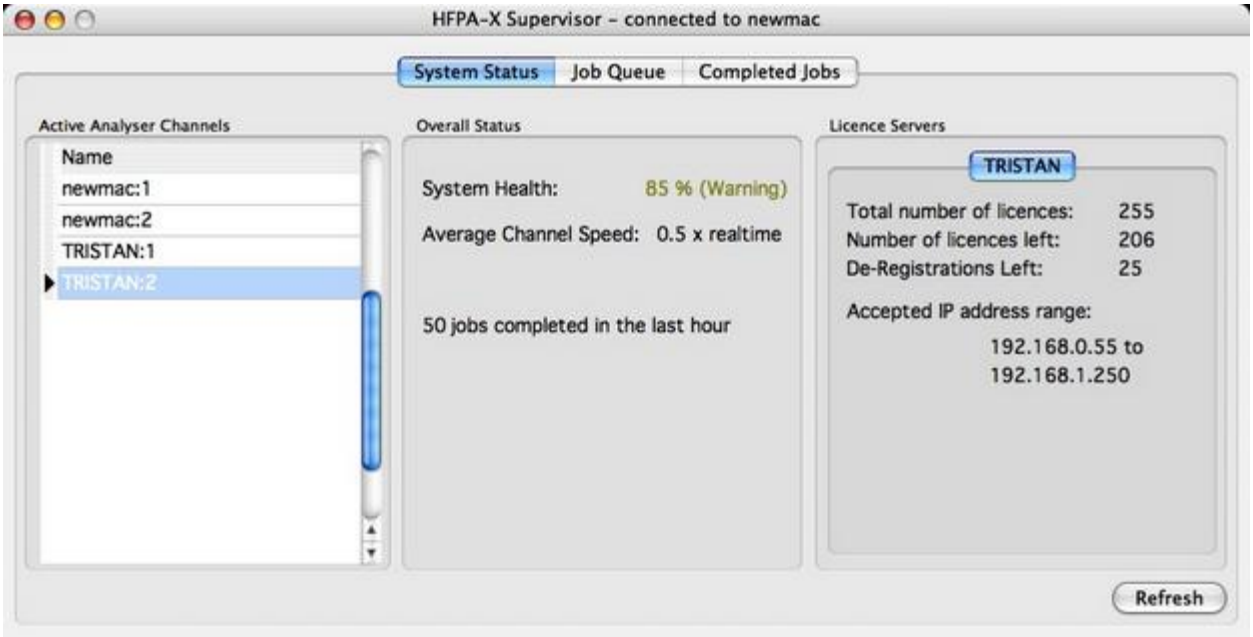
Entering the password for the Supervisor application

On the *HardingFPA-X Supervisor* interface, there are three tabs. The first of these is a general overview of the *System Status*, and shows various pieces of information about the system as a whole and allows the supervisor to be able to see immediately if there are any serious errors occuring in the system as well as viewing a list of all of the currently active *Analyser* channels and *Licence Server*s. Please note that *Licence Servers* will only appear in the list if they are from the same version of the HardingFPA-X as the *Supervisor* application.

The *System Health* value is a percentage that describes the proportion of the last 20 jobs that completed successfully. Note that this does not refer to the pass/fail status of the jobs, but whether or not a serious error occurred meaning that the job could not be analysed at all.

The *Average Channel* speed value is the average rate at which an *Analyser* channel will analyse jobs, so that you may see the expected speed of jobs being analysed at the moment. This is per channel, so if your system has an *HardingFPA-X Analyser* with two channels (as in a typical installation), the actual system throughput will be twice this value.

At the bottom of the *Overall Status* section, the number of jobs that have been completed in the last hour is shown.



HardingFPA-X Supervisor interface

The *Supervisor* also features a *Job Queue,* which shows all of the jobs that are waiting to be analysed or are currently being analysed – in the order in which they will be opened by the *Analysers*. The final tab (*Completed Jobs*) shows all of the jobs which have been analysed (or have been aborted or terminated with an error condition). Unlike the *Monitor* and *Submit*, this window shows ***all*** completed jobs, not just those from the last 14 days, and shows which user submitted which jobs and which *Analyser* analysed the job.

Job Priorities

By default, all jobs submitted to the system, whether via *Submit* or *Monitor* (watch folders etc), have an initial Job Priority of ***0***. In effect this means the job is neither low priority nor high priority. A job's priority value can be between -10 and 10.

If all jobs have the same priority, then they will be analysed in order of submission, i.e. the lowest *Job ID* number first (please note that some later jobs may be analysed before earlier ones if the *Analyser(s)* configured for that job length is busy). If the queue contains jobs of mixed priorities, then they are analysed first in order of priority, then in order of job ID. For example if two jobs have priority ***1*** but all the rest have a priority of ***0***, the priority ***1*** jobs will first be analysed in the usual order of their *Job ID*, after which all jobs of priority ***0*** will be analysed, also in order of *Job ID*, etc.

Using the *Promote Job* and *Demote Job* buttons under the *Job Queue* tab, the administrator may increase or decrease the priority of the selected job respectively. The change in priority is shown in the *Job Priority* column. Be aware that you cannot increase the priority to greater than 10, or decrease it to lower than -10.

The change in the job order is reflected immediately in the order displayed in the *Job Queue*. If a job is demoted whist it is being analysed, the job status will be reset to '*waiting'* and the *Analyser* in question will stop analysing it. This is a method of temporarily halting a job, effectively rescheduling it for a later time. The job will remain in the *Job Queue*, but be aware that analysis will not resume from the point at which the job was demoted. The analysis will have to start again from the beginning of the clip.

Promoting jobs is a useful tool for administrators to be able to advance emergency and/or time critical jobs to the top of the queue. Be aware that if a job is demoted to have a negative priority, it may not be analysed at all if a continual stream of jobs is submitted, as the newly submitted jobs will, by default, have a higher priority. To be sure, always set all job priorities back to ***0*** after manipulating the job queue for emergency jobs etc.

Aborting Jobs

It is also possible to abort jobs currently in the job queue by clicking the *Abort Job* button whilst the chosen job is highlighted. If the job is currently being analysed, the *Analyser* will stop the job and move on to the next available one. If a waiting job is aborted, its status will be set to "*aborting*", and will then be set to "*aborted*" and removed from the job queue after five minutes has passed. This is to ensure that the job has not been picked up by an *Analyser* in the meantime. *Aborted* jobs are still shown in the *Completed Jobs* tab.

HardingFPA-X Submit

This application is designed to be run on any number of licensed client computers and allows the user of that computer to submit jobs to the database ready for the *Analyser*(*s*) to process them. Once a job is completed, the *Submit* application allows the user to right-click on the completed job and launch the *Viewer* or a third party PDF reader to view the results of the analysis.

The *Job Queue* lists all of the currently pending jobs for all connected *Analysers* in the system, and the *Completed Jobs* list shows all of the completed jobs for the last 14 days.

The *Submit* application must be configured to point at the current root path in order to submit jobs and view results. Detailed instructions can be found in the *HardingFPA-X System User's Manual.*

If you would like to lock the settings for the *Submit* so that client users cannot modify them, you may set up the *Submit* how you wish and then set the preferences ini files to read only for the users in question. On Windows Vista/Windows 7 this is provided automatically by the "Run As Administrator" option.

The database settings are stored in:

Mac: */Library/Preferences/com.crsltd.hfpadatabase.ini*

Windows: On Windows, the settings are stored in the registry key `[HKEY_LOCAL_MACHINE\SOFTWARE\Cambridge Research Systems\HFPAXDatabase]`. A restricted user will not be able to write to these unless the application is run as an administrator.

The database settings are shared between all applications installed on the same computer.

The general *Submit* settings are stored in:

Mac: */Library/Preferences/com.crsltd.hfpasubmit.ini*

Windows: On Windows, the settings are stored in the registry key `[HKEY_LOCAL_MACHINE\SOFTWARE\Cambridge Research Systems\HFPAXSubmit]`. A restricted user will not be able to write to these unless the application is run as an administrator.

HardingFPA-X Viewer

This is the part of the HardingFPA-X system which allows the client computers to view the results of completed analysis, displayed in the same way as in the standard version of the HardingFPA, with the additional benefit of being able to replay the image sections.

The *Viewer* is usually installed on the same computers as the *Submit* application and is launched automatically to view results.

Detailed instructions for the usage of *HardingFPA-X Viewer* can be found in the *HardingFPA-X System User's Manual.*

Example Advanced Configurations

The HardingFPA-X System is very versatile, and can be set up in many configurations. For example it is entirely possible to have all the required Server, Supervisor and Client components on a single computer, but the flexibility provided by the HardingFPA-X System allows for more complex and useful configurations such as those detailed below. Please note that additional licences may need to be purchased in order to run multiple *Analysers* and databases.

- ***Typical Usage***: Running the main database, *Launcher*, *Monitor*, *Licence Server* and *Analyser* on one powerful multi-core computer, and connecting multiple clients each with a *Submit* and *Viewer*. This configuration separates the tasks of analysis from the submission of jobs and viewing of results, leaving the main server computer with plenty of time to process jobs. Jobs can also be submitted via watch folders and XML tokens due to the presence of the *Monitor*.

- ***Multiple Analyser Nodes:*** Having a single computer running the database, *Monitor* and *Licence Server*,

then having for example three computers all running separate *Analyser* instances (with *Launchers*). Multiple clients connect as before but this time the three dedicated *Analysers* together can process approximately three times as quickly as the scenario above.

- ***Multiple Databases:*** In circumstances whereby you need to have a number of distinct different job queues, you could have the database installed multiple times, once for each queue, and then have a set of applications connected to each.

Troubleshooting

Symptom	Solution
Client computers cannot find the *Licence Server*, and nothing appears in the log window	Check the settings on the *Licence Server* to see that the IP range is set correctly so that it includes the IP address of the client attempting to connect. If the IP range is OK, check if the clients are using ***Manual Licence Server Location Mode***. If so, make sure the specified IP address/hostname is correct
When running the *Analyser* on Mac OS X, the error message *"HASP SRM Protection System Feature not found (31)"* appears, even though the HASP key is inserted.	The HASP key you are using is an older one, which requires a firmware update. Please see the ***HASP Firmware Update*** folder on the installation media provided with the HardingFPA-X.
Client computers receive the error message "A general error has occurred whilst trying to access the *HardingFPA-X Licence Server*"	There may be more than one *Licence Server* on the network with overlapping IP ranges. Change the ranges on the servers to not overlap
Cannot log in to the Administration tab on the *Licence Server*	The default password is "password"
Cannot log in to the *HardingFPA-X Supervisor* application	The default password is "adminhfpax"
Forgot administrator password for *HardingFPA-X Licence Server*	Contact Cambridge Research Systems Ltd. For details on resetting the HASP password
Forgot supervisor password for *HardingFPA-X Supervisor*	Start the *Supervisor* application on the same machine as the database is installed on, and enter no password. The database will authenticate and you can change the password with Tools -> Change Supervisor password
Job does not get analysed, but stays at the bottom of the *Job Queue*	Check the priority of the job; it may have an unusually low priority. Promote the job to a higher priority using the *Supervisor*.

Jobs are not being analysed because the *Analyser* cannot find the movie files	Make sure the *Analyser* has access to the files in question, and that the *Submit* and *Analyser* applications have the correct *Root Path* settings
Analysers do not open files dropped into watch folders	Check that the file extension is one of the supported extensions (mpg, mpeg, dv, mov, avi, wmv, vob, xml, mp4, m2v) and that the case of all of the letters in the extension are the same (e.g. MOV, not MoV). Files dropped into watch folders must also ***not*** be read-only. Files must be larger than 2k
Analysers will not run, and give an error message such as "This version is older than the newest version in the system"	The system has been upgraded, but the *Analyser* in question has not. Upgrade the *Analyser* to the same version as the rest of the system
The paths and database settings are correct, but the *Analyser*(*s*) will not analyse a particular job	Does the computer analysing the job have the required codec? – check if the file can be viewed correctly in QuickTime. Also check if the frame size is within the accepted range: 702 – 720 x 576/608 pixels (PAL) or 702 – 720 x 480/486/512 pixels (NTSC)
The Server installer on Mac OS X hangs and does not complete	If you are upgrading, make sure all HardingFPA-X applications on your entire network are not running. This includes *Analysers*, *Monitors*, *Submits* and *Supervisors*

Licence Terms

HardingFPA-X Server and Supervisor applications use the Silk icon set from http://www.famfamfam.com/lab/icons/silk/

Some HardingFPA-X Analyser plugins use external libraries and makes extensive use of the following persons' or companies' code:

FFmpeg - Copyright (c) 2000-2009 Fabrice Bellard, et al.

http://www.ffmpeg.org/

The source and build instructions for the included FFmpeg libraries are contained on the HardingFPA-X installation media.

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Version 2.1, February 1999

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