

ISILON AND ADOBE PREMIERE PRO CONFIGURATION AND OPTIMISATION GUIDE

UNDERSTANDING THE OPTIMISATIONS TO IMPROVE
PERFORMANCE AND ENHANCE WORKFLOWS

OneFS 8.1.x

Adobe Premiere Pro 12.x

Abstract

This document explores the options available to configure and optimise Dell EMC Isilon and Adobe Premiere Pro, and provides guidance for achieving the best performance and optimal workflow.

It is intended that architects and system integrators use this document as a guide when designing, configuring and maintaining systems.

August, 2018

Version Control

<i>Date</i>	<i>Version</i>	<i>Notes</i>
August 2018	1.0	Initial Release

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Configuration and Optimisation Guide

Document Scope

This document is intended to guide system administrators and architects when designing and configuring Adobe Premiere Pro to be used with Dell EMC Isilon. The document covers configurations and optimisations for both the Adobe Premiere Pro application, and Dell EMC Isilon OneFS.

This document focuses on the configurations and optimisations that may yield performance and usability benefits when using the creative functions of Adobe Premiere Pro. However, this document does not attempt to cover all aspects of working. In particular, this document does **not** cover:

- Adobe Team Projects
- Exporting from Adobe Premiere Pro, or Adobe Media Encoder
- Dell EMC Isilon cluster sizing.

About Adobe, and the Creative Cloud Suite

The Adobe CC suite comprises a collection of applications for creative professionals:

- Adobe® Premiere® Pro CC is a professional video editing application that serves as the hub for Adobe production workflows. Adobe Premiere Pro runs best with ample memory and powerful CPUs and graphics - especially when working with large file formats or VR content.
- Adobe® After Effects® CC is an industry leading motion graphics and visual effects tool. The application makes good use of fast storage for the application's global performance cache technology, especially for easy access to complex compositions.
- Adobe® Media Encoder CC provides ingest, transcoding and final output for virtually any viewing platform. It can be automated via watch folders and scripting and benefits from powerful CPUs and GPUs.
- Adobe® Audition CC is a professional audio workstation with Dynamic Link integration to Adobe Premiere Pro CC. Since audio files are smaller than video content, they are less of a concern for storage and performance, but the tight integration between the tools means much greater workflow efficiency for users and facilities. Key benefits of using Adobe tools with Dell EMC Isilon Integration
- Adobe interoperability with many different Media Asset Management (MAM) systems enables selection of best-of-breed applications to suit demanding and unique workflows.
- The integration between all the applications in the Adobe CC suite streamlines many common production workflows – for example, the Dynamic Link between Adobe Premiere Pro and After Effects.

Adobe Premiere Pro and Dell EMC Isilon - Perfect Partners

Performant shared storage is an essential foundation of any collaborative workflow, and Dell EMC Isilon may be deployed with Adobe creative tools for streamlined and efficient operations:

- Adobe Premiere supports collaborative production workflows using shared project files and connected user-designated storage locations for assets.
- Adobe Premiere Pro allows users to edit native files directly from their storage for greater speed and efficiency and a simplified infrastructure. Working in this way demands the high performance delivered by Dell EMC Isilon.
- The Adobe CC suite of applications support native workflows – where source material can be incorporated and manipulated in its native form, without the need for transcoding. Working with native and high-resolution material can make heavy demands on the supporting infrastructure, and requires the high performance, capacity and scalability of Dell EMC Isilon.

Adobe Premiere Stand-Alone and Team Projects

Adobe Premiere features *Team Projects* - a cloud based collaboration toolset. This document in its current version does not make any attempt to suggest configuration optimisations applicable for Team Projects, and instead focusses on performance and compatibility of the base Adobe Premiere Pro CC.

Before you start

Premiere and multi-platform support

Adobe Premiere Pro is a cross-platform application, and versions are available to support both macOS and Windows. Before making any application optimisations, generic platform optimisations should be addressed - details of which may be available in other guides (please refer to your Dell EMC support representative). It should be noted however that some application configurations contained in this guide may vary according to platform.

Environment Design and Optimisation

Before making any application optimisations, the specific requirements for operating environments should be addressed. For example:

- Networking Optimisation
- Network Interface device configuration and optimisation
- Workstation RAM, CPU and GPU.
- Consideration of the full workload.

Adobe Premiere Pro and Dell EMC Isilon are capable of supporting very high throughput workflows - including multiple streams of uncompressed 4K dpx. When designing and configuring a solution to work with high throughput, it is important to pay close attention to the solution as a whole.

It must be recognised that the overhead of supporting any remote storage is different to the overhead of supporting local or direct-attached storage. When iterating through optimisations, there is only minimal value in comparing the performance of any application as it interacts with different types of storage. Instead, it there is more value in measuring improvements.

Similarly, whilst speed-test utilities may help with initial “ball park” optimisations, care should be taken to optimise with the target application. This is because not all applications and test utilities access the storage in the same way – and may (for example) use a different number of concurrent threads, or different protocol calls. Instead, there is more value in measuring improvements when using the target application.

Isilon Sizing guidelines

This document does not provide detailed guidance regarding the sizing or node-type specification of Dell EMC Isilon that should be most appropriately used for any particular throughput or workflow.

Other documents are available that detail the performance requirements for particular workflows (for example, uncompressed 4K/UHD, or compressed HD editing). Care should be taken to size the storage correctly for performance and capacity - which may be calculated based on the requirements of the installation.

Adobe Premiere Pro Filesystem Access Profile

File Type

Adobe Premiere Pro reads and writes files with two distinct natures - larger media files, and smaller metadata files.

- Media
- Video
- Audio

- Application Metadata[1]
- Projects
- Sequences

The performance of any application that uses media files tends to benefit from configurations that are optimised for streaming filesystem access. The performance of an application that accesses application metadata files tends to improve with configurations that are optimised for more random and IOP intensive filesystem access.

All filesystem interaction from applications that is rapid and frequent benefits from the optimisations that are brought about by filesystem metadata[2] acceleration. Rapid and frequent access is characteristic of real-time growing media files, transcoding of media files, and frequent updating of filesystem metadata.

- [1] Application metadata: files that are written and read by the application.
- [2] Filesystem metadata: information about the data on storage.

Adobe Premiere Pro includes options to write different type files to different directories on Isilon storage, and this feature may be used in conjunction with Isilon configuration options to make optimal choices for the different access profiles of the application. Guidance is provided later in this document.

File Usage

Created Media

The application will as part of its functionality create files, and write them to the storage. The created files may for example be video files that are being recorded by the application, or temporary preview files that are created as the application is used.

- Captured Video
- Captured Audio
- Video Previews
- Audio Previews

Access Profile

Adobe Premiere Pro (in common with many applications of the same type) accesses files on storage in a specific manner that is very different to typical enterprise applications.

- Streaming video and audio - with latency critical read profiles.
- Video frame-based file access
- Read-ahead application caching

Video and audio files represent moving images and audio. A key characteristic of a video or audio file is that when the file is being consumed, the contents must be temporally consistent with expectation. That is, the frames of video or audio must be displayed or presented at the right time, in sequence.

For example, a moving video is typically described as having a number of still image frames per second - which might be fixed at 25, 30, 50 or 60 (or more), or might be variable. In all cases, the metadata information embedded in the file will contain information about the exact timing required for each frame. When the application reads those files, it must access the data for each frame in time for it to be displayed.

The requirement for this behaviour demands that files must be read with a consistent latency, and with a latency that permits real-time playback. This is in contrast to a standard enterprise requirement where reading files in a less consistent way may be tolerated. For more background information, please review:

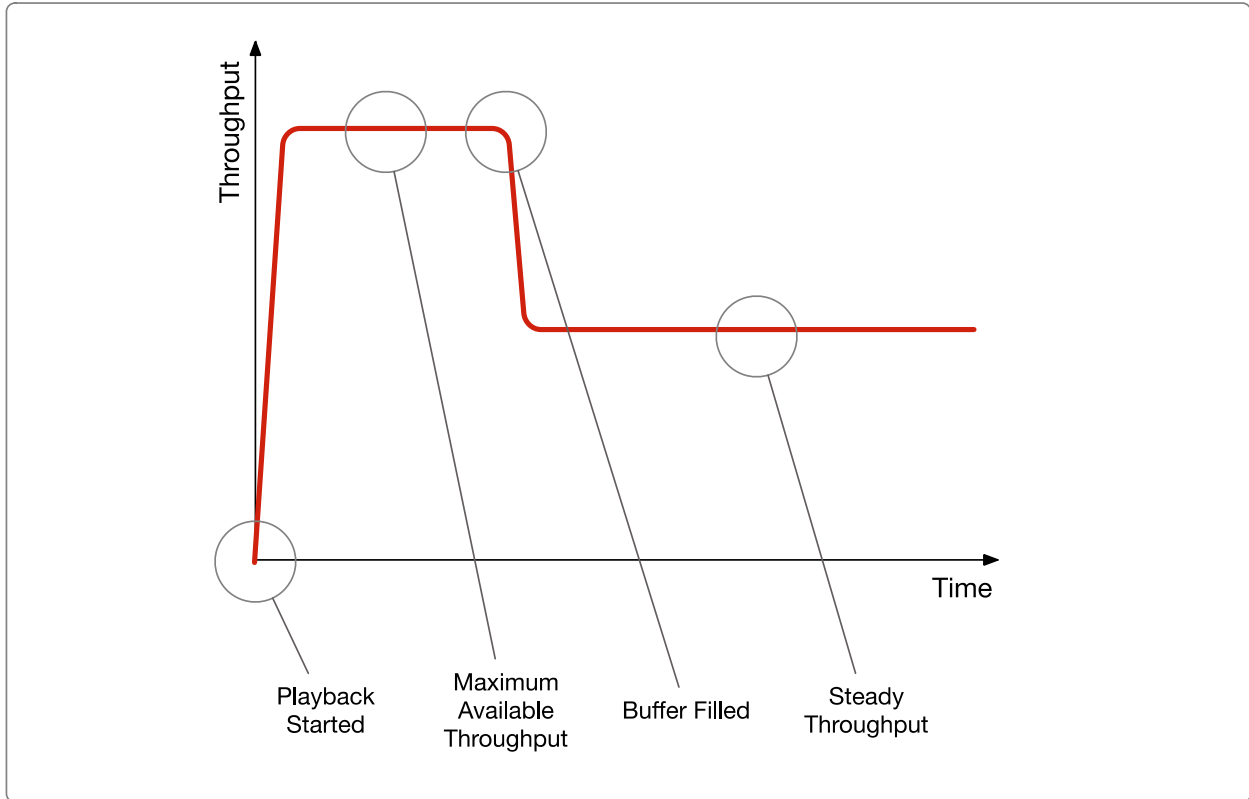
<https://www.emc.com/collateral/whitepaper/h16818-wp-uncompressed-high-resolution-workflows-isilon.pdf>

Adobe Premiere Pro features an application read-ahead cache, which allows the application to smooth out any small inconsistencies in access to the file system. When

the application first starts to access a file for video playback, the caching engine will read-ahead as far and as fast as it can, in order to fill the read-ahead cache.

During this period, the read profile of the application will feature a significantly higher read throughput than might be expected when considering the data rates of the media files being accessed.

Care should be taken to design a full solution that can accommodate the characteristic throughput surge of the application as playback is commenced, in a way that does not impact other applications and clients.



Characteristic Playback Throughput Surge.

Workflow Phases

There are four key workflow phases when interacting with Adobe Premiere Pro:

- Import Media – Introduce media to the application
- Work with Media – The Creative Process
- Deliver – Exporting the completed product to the next stage in the workflow
- Media lifecycle management – Archive and delete

Each phase of the workflow makes different demands on the storage, and requires different optimisation. Typically, a solution will be designed to optimise for the most important or demanding phase - the creative process.

At the import phase, the application may not require to create media - but low latency filesystem access can be important when the application is required to index a high number of files. This is particularly important when working with image sequences (such as DPX), where there are a very high number of files.

Where the import phase consists of using the application to acquire linear media (SDI or IPVideo), then performance and latency again become critical.

During the creative process, it is important to maintain a high-quality user experience. When designing a system, architects will need to consider both quantitative and subjective requirements.

- Throughput
- Latency
- Demands of different codecs
- Scrubbing
- Multi-track
- Subjective “feel”

Though hardest to quantify and measure, the subjective “feel” of an application as it is used by a Creative Artist is arguably the most important measure of a successful system design. An Artist may describe a system that responds well and is easy to use as “snappy”, whilst a system that does not respond well and is difficult to use may be described as “sluggish”.

For a system to be “snappy”, the storage component must deliver data to the application in a way that doesn’t interrupt the creative process.

When fulfilling the delivery phase, the immediate user experience of the application is less apparent. However, Adobe Premiere Pro (and Adobe Media Encoder) make high demands of the application as they write completed files. Depending on the nature of the file format being created, the demands may be significant - particularly for high resolution images, image sequences, and codecs that demand many small write operations.

The archive and deletion phase demands a high performance and responsiveness, as the application moves and deletes files.

Optimising for performance and collaboration

For most environments and workflows, it is possible to configure the environment and application to deliver performance that adequately accommodates the requirements of the creative process in a collaborative environment.

In most cases, the most robust and easily maintained configuration is to use the Isilon shared storage for media files, and workstation storage for media cache and database files. Guidance regarding the targeting of different files to storage is given later in this document.

In a collaborative environment, care should be taken to avoid file collision and corruption caused when more than one workstation attempts to access a file or project at the same time. In most cases, the use of Project Locking is recommended – and guidance for this option is detailed later in this document.

For more information regarding collaborative video editing and project sharing, please refer to the guide published by Adobe at:

<https://helpx.adobe.com/premiere-pro/how-to/collaborative-video-editing.html>

Performance Benchmarking

There exist a number of applications and utilities that may be used to measure the performance of storage systems, and a subset of those are optimised for media workflows, and present findings in a way that is useful to those designing systems for media.

Whilst these utilities can be useful in a general sense in the early stages of setup and optimisation, it is important to recognise that Adobe Premiere Pro (in a characteristic that's common to many applications) has a unique filesystem access profile - and optimisation work should be measured against the performance of the application itself.

DogEars Monitoring Utility

Adobe Premiere Pro has embedded a useful benchmarking and monitoring tool named *DogEars*. When enabled, DogEars provides an on-screen display showing important performance information.

Enabling DogEars:

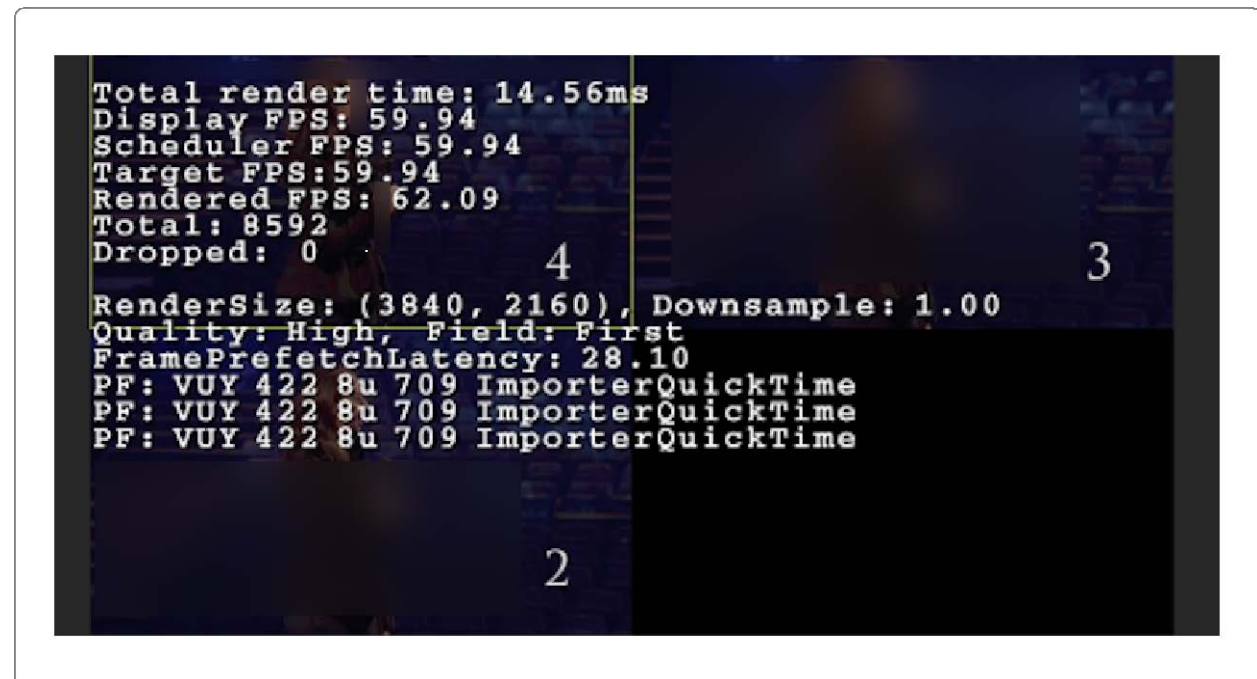
DogEars may be toggled on or off via a keyboard shortcut.

- Windows: [CTRL] + [SHIFT] + [F11]
- macOS: [CMD] + [SHIFT] + [F11] (+ [FN] – depending on keyboard configuration)

The DogEars overlay will become visible as an overlay on the Programme or Source window. When enabled or disabled, DogEars will only appear or disappear once video playback has started or stopped.

Understanding DogEars

When enabled, DogEars displays a number of data points in real time whilst video is playing in an application window. The data is overlaid on either the preview or playback window in the Adobe Premiere Pro application. It's important to understand the data, and what it is revealing about the solution as a whole (including workstation, networking and storage).



Dogears display

Total render time

Displayed as a measure of time, normally in milliseconds.

The Total Render Time is the time taken to render each frame of video. If the render time is not less than display duration of a frame of video (calculated by factoring the number of frames per second of the media), then playback is not viable.

Display FPS

Displayed as a number of Frames per Second.

The number of frames per second of video that the application is delivering at that instant in time. This should be almost exactly (with a small tolerance for calculation and display errors of the data) the specified frame rate of the video clip or timeline.

If the Display FPS is less than the specified frame rate of the video clip or timeline, then frames are being dropped, and smooth playback is not viable.

Scheduler FPS

Displayed as a number of Frames per Second.

The number of frames per second that the application is attempting to play back. This should normally be the same as the specified frame rate of the clip or timeline being played.

Target FPS

Displayed as a number of Frames per Second.

The specified frame rate of the video clip or timeline being played.

Rendered FPS

Displayed as a number of Frames per Second.

The mean number of frames per second that the application has been rendering since playback was commenced.

When playback is commenced, the application works to render as many frames as it can as quickly as possible, in order to build an application pre-fetch buffer. During the first few seconds of playback, the instantaneous Rendered Frames per Second will consequently be very high, but will drop to the target frame rate when the application pre-fetch buffer is full.

Because the displayed value is an average of the instantaneous frame rate over time, it will start high, and will gradually tend towards the target frame rate. For long playbacks, the displayed Rendered Frames per Second will eventually be almost equal to the Target Frames per Second. If the displayed value ever drops below the Target Frames per Second for an extended period, then the application is consistently dropping frames, and smooth playback is not viable.

Total

Displayed as a number of Frames

The total number of frames that have been displayed since playback was commenced.

Dropped

Displayed as a number of Frames

The total number of frames that have been dropped since playback was commenced. Whilst it is easily understood that the number of dropped frames should ideally be zero, it is not necessarily a cause for concern if a few frames have been dropped during the course of a long playback - particularly around the start of playback, or at transitions in a sequence. Additionally, the application may from time-to-time drop a video frame to ensure audio and video remain in sync.

If a limited number of dropped frames are observed, careful consideration should be given to the actual impact on the required workflow. If however the application is consistently dropping a high number of frames, and the dropped frame count is continuously increasing, then that indicates that playback is not viable.

RenderSize

Displayed as a number of pixels.

The RenderSize indicates the resolution of the image as it is created by the application. Note that the RenderSize is not necessarily the resolution at which the image is displayed on the screen - because that is dependent on the actual resolution of the monitor being used.

Using the drop-down menu at the bottom right of the display image, it is possible to reduce the RenderSize to a fraction of full resolution - and the RenderSize and Downsample data points displayed by DogEars will change accordingly.

A lower RenderSize does not normally affect the amount of data that is read from the storage (except in the case of some specific proprietary plugins and codecs).

In some scenarios, bad playback performance caused by a lower performance workstation may be mitigated by rendering only a reduced resolution image. However, there are many variables that influence performance, and experimentation on particular implementations is advised.

Downsample

Relation of display resolution to the source resolution.

The Downsample is the divisor used to calculate the display resolution as a fraction of the resolution of the source material. A value of 1.00 indicates that there is no downsampling.

Quality

Displayed as a description, including the field order.

The quality of the image being rendered, alongside information about the field order of the codec.

FramePrefetchLatency

Displayed as a measure of time, normally in milliseconds.

The time in milliseconds that the application took to read the frame of video from storage.

PF (Pixel Format)

Displayed as a description, noting the importer (decoder) that's being used.

A technical note about the application module being used to decode the video file.

Working with DogEars

DogEars is a powerful analysis tool, and is the best tool to use to measure changes when optimising the whole environment. It can be tempting to optimise a system whilst measuring performance with a more generic speed-test utility. However, even utilities that are designed to display results in a “media friendly” format may not interact with the storage in a similar way to Adobe Premiere Pro.

It is important to be able to interpret the data that can be shown by DogEars, and to use the information to correctly influence decisions in the optimisation process. There are a number of ways to work with the data, but it may be useful to follow these guidelines:

Representative Project and Sequence

Build a Project and Sequence that accurately represent the required use case.

The first step in optimising an environment, is to build a project and sequence that represents the use case. This will include:

- Test media clips of the correct format and encoding. The clips should be of sufficient duration such that their size they should exceed the available memory capacity of

the workstation. The media should be placed on the Isilon storage cluster, in a directory that has the desired settings applied (e.g. Streaming profile and Metadata acceleration, etc).

- Sequences (sometimes also known as a timeline) with an appropriate number of video and audio tracks. The tracks should be layered, and have some effect applied such that all the video tracks are “visible”. The sequence should match the format of the source material. It is important to validate that the workstation is able to support the application, and has sufficient CPU, GPU and RAM to work with the material being tested.
- Simple and complex sequences should be prepared. A simple sequence has one or more contiguous portions of media, with few (if any) edits. A complex sequence will have a number of layers, and complex edits. The purpose of a complex sequence is to challenge the application and its demands on storage.

Dropped Frames Test

Can media be played without dropping frames?

The ability to play a video track (or multiple video tracks) without dropping frames is a fundamental requirement. Use the dropped frames count to monitor how many frames are being dropped as playback starts, and progresses.

A perfect scenario is one where there are zero dropped frames at any point in playback. However, it can be considered acceptable to drop just a few frames during the course of a playback – particularly in the case of a long or complex sequence.

- If the number of dropped frames continuously grows, then that is an indicator that playback cannot be supported.
- If the number of dropped frames briefly grows around edit point transitions, but then stabilises, then that may be an indication that the application is finding it difficult to open a new file and start streaming in a timely manner. Consider checking the entire system for latency, and that the OneFS optimisations (as detailed below) have been applied.
- If the number of dropped frames grows only at the start of playback, then that may be an indication that the system is unable to deal with the playback throughput surge cannot be accommodated.
- If the number of dropped frames on one workstation can be negatively impacted by throughput from a different workstation, then that may indicate either a system bottleneck (for example, network) or that the applications are reaching the maximum available throughput of the storage cluster, as the workstations contend for available throughput.

Render Time Test

How long does each frame take to render?

Each video frame must be rendered by the application in less than the time for which the same frame is displayed. If it takes longer to render, then sustained playback is not viable.

The time for which each frame is displayed may be calculated with reference to the frame rate of the material being used.

Frame Rate (Frames per Second)	Frame Duration (milliseconds)
24fps	42ms
25fps	40ms
50fps	20ms
30fps	33ms
60fps	17ms

Frame durations for common frame rates.

- Ideally, the render time for each frame should be consistently lower than the duration of each frame.
- Brief transients where one or two frames take longer to render may be accommodated by the application cache – provided that the mean duration over time is consistently lower.
- Where the render time is consistently higher than the duration of the frame, then that may be an indication either that the system is unable to support the required throughput, or that the latency of the system is too high.

Frame Prefetch Latency

What is the latency for the frame pre-fetch?

The time in milliseconds that it took to read the data for a single frame of video from storage. This time should be consistently lower than the display duration of a frame of video (calculated by factoring the number of frames per second of the media – as above) - though infrequent transients are normally accommodated by the application pre-fetch buffer.

- If the FramePrefetchLatency is consistently too high, then playback is not viable.
- If the pre-fetch time is too high only for brief transients, then sustained playback may be viable.

- If the pre-fetch time on one workstation can be negatively impacted by throughput from a different workstation, then that may indicate either a system bottleneck (for example, network) or that the applications are reaching the maximum available throughput of the storage cluster, as the workstations contend for available throughput.

Rendered Frames Per Second

What is the mean number of rendered frames per second?

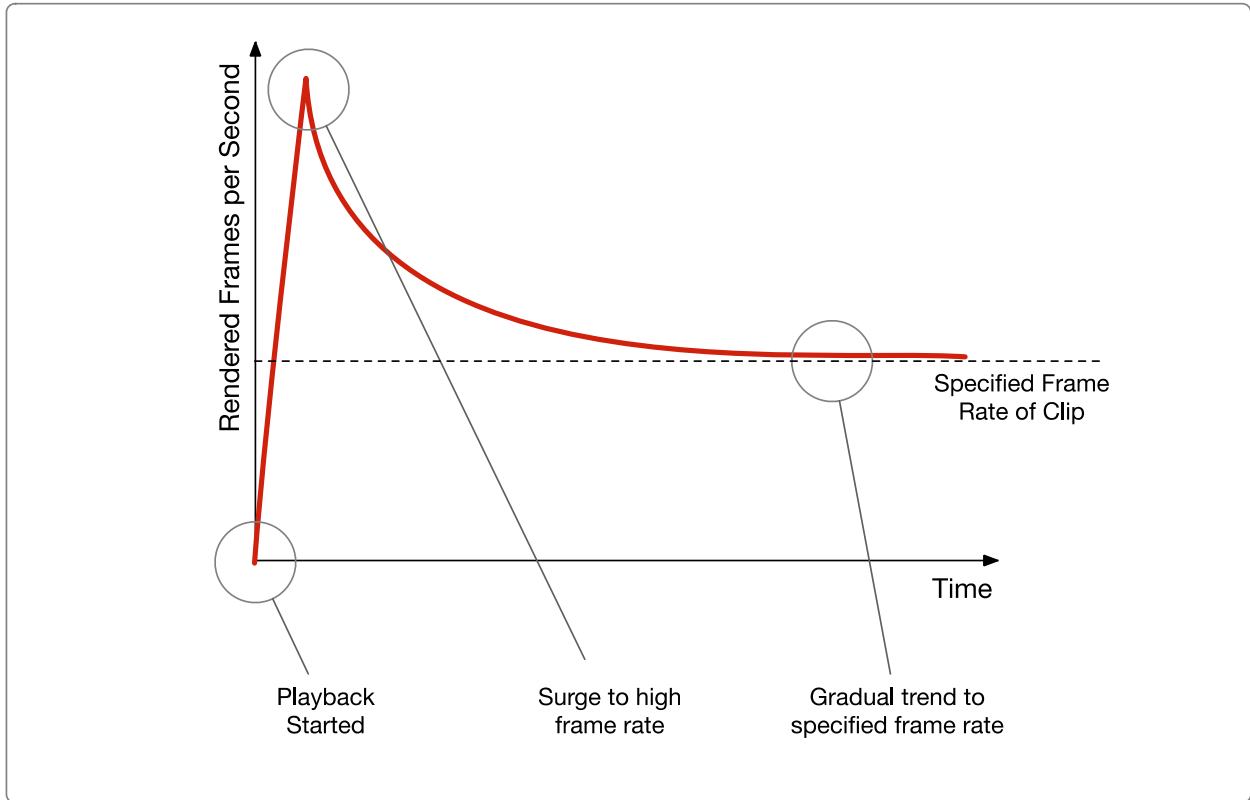
Interpreting the reported mean number of frames per second can be confusing, and it's important to take time to understand the information. The mean number of rendered frames per second is not always useful information, and care should be taken to use the data point in context, and in conjunction with other information.

When playback is commenced, the application works to render as many frames as it can as quickly as possible, to build an application pre-fetch buffer, and frames are rendered at a significantly faster rate than the frame display rate. The limiting factor for the instantaneous Rendered Frames per Second may be:

- The power and performance of the workstation.
- The complexity of the codec.
- Network throughput or contention.
- Storage performance.

During the first few seconds of playback, the instantaneous Rendered Frames per Second will consequently be very high, but will drop to the target frame rate when the application pre-fetch buffer is full.

Because the displayed value is an average of the instantaneous frame rate over time, it will start high, and will gradually tend towards the target frame rate. For long playbacks, the value will eventually almost be equal to the target value. If the displayed value drops below the Target for an extended period, then smooth playback is not viable.



Average Rendered Frames per Second tending towards Frame Rate

The mean number of frames per second that are rendered is a data point that can be most useful during long playback tests, where the value has tended towards the frame rate of the clip being played. It can be useful to compare the mean value with the instantaneous value.

Configuration Guide

Optimisation scope

There are five categories of configuration actions to consider when configuring and optimising an environment to support Adobe Premiere Pro working with Dell EMC Isilon.

- Security and Access Control
- Environment optimisations – e.g. networking
- Platform optimisations (workstation operating system)
- Storage configuration and optimisations
- Application configuration and optimisations

As noted earlier, this document does not cover platform or environment optimisations since these topics are covered elsewhere (application optimisations that are specific to one platform are covered in this document). Similarly, security and access control considerations are covered elsewhere – and this document is limited to defining requirements rather than making configuration recommendations.

Quick Checklist

- Create Local Users or bind to Active Directory in accordance with the access policy.
- Configure firewalls and internet access of client machines in accordance with security policies, and Adobe licensing requirements.
- Create SMB Share.
- SmartConnect - configure as appropriate to the environment.
- Configure data layout and access patterns to Streaming.
- Configure node SSDs to support Metadata Read/Write Acceleration.
- Configure application for each workstation.

Detailed Configuration Guide

It should be noted that every environment is different, and that no one set of guidelines can be applied universally. System administrators and architects are advised to consider the implications of different configuration options, and make a selection according to the local environment and requirements.

Security and Access Control

Media stored by an organisation may be that organisation's most valuable asset. In the modern age it is no longer a sensible option to simply have "read-write access for

everyone, everywhere". Proper attention should be paid to security and access control. In particular, consideration should be given to:

- Access to the SMB share.
- Permission to read, write, change or delete files.

OneFS supports a rich set of authentication, access control and directory binding capabilities, and these may be used in conjunction to manage different users as they access the shared storage. Alternatively, it may be possible to use the local user provider of OneFS to manage a small number of connecting clients.

It should be noted that Adobe Premiere Pro is licensed via a cloud subscription model – and that in most scenarios the application will require to be able to connect to the internet. Careful consideration should be given to managing the consequent security and access challenges.

Architects should consider three key optimisations for OneFS when deploying in an Adobe Premiere Pro environment.

OneFS Configuration and Optimisation

Connection Protocol

Whichever client platform is used, the connection protocol should be SMB. Different workstation operating systems support the SMB protocol stack to a greater or lesser extent. For example, the Windows operating system currently supports SMB3 multichannel – which when properly configured can deliver a higher single stream throughput capability.

Configuration and optimisation of the client SMB stack is outside of the scope of this document, and is covered elsewhere. Care should be taken to review the connection, configuration and optimisation guidelines that are appropriate for the platform being used.

Using the standard WebUI for OneFS, create a share, and make it available with appropriate permissions and access to the required users.

OneFS Optimisations

Architects should consider three key optimisations for OneFS when deploying in an Adobe Premiere Pro environment.

- Metadata Read/Write Acceleration
- Streaming Mode
- FileName PreFetch

Metadata Read/Write Acceleration

Overview

File access performance can in some workflows be optimised by enabling Metadata read/write acceleration. When enabled, this optimisation sees OneFS use SSDs for reading and writing filesystem metadata - which can improve access time and reduce latency. Where all underlying storage units are SSD - as in the case of Isilon F800 All Flash, then this is not a meaningful or required optimisation.

Enabling

Metadata read/write optimisation can be enabled as a File Pool Policy at the OneFS Web User Interface. More information and guidance is available in published documentation:

http://doc.isilon.com/onefs/8.1.0/help/en-us/index.html#ifs_c_ssd_pools.html

Streaming Mode

Overview

Streaming performance of OneFS can be optimised by enabling Streaming Mode at the file pool, or at the directory level. Streaming performance is important when playing media linearly - for example when playing a video sequence in a time line.

Consideration should be given to other workflows hosted in the same pool or directory before enabling Streaming mode. Best performance for all workflows on a single cluster might be achieved by selectively enabling Streaming Mode on a limited number of directories.

Operation

Streaming Mode optimises two behaviours of OneFS to deliver increased streaming performance:

- Data is striped across more underlying storage units (disc drives or SSDs).
- Data is prefetched aggressively.

Enabling

Streaming mode can be enabled as a File Pool Policy at the OneFS Web User Interface. More information and guidance is available in published documentation:

```
http://doc.isilon.com/onefs/8.1.0/help/en-us/index.html#ifs_t_configure_default_io_optimization_settings.html
```

```
http://doc.isilon.com/onefs/8.1.0/help/en-us/index.html#ifs_t_modify_file_and_directory_properties.html
```

It should be noted that when Filename Pre-Fetch (outlined below) is also required and enabled, there is an interaction between the two optimisations - which must be considered when configuring.

FileName PreFetch

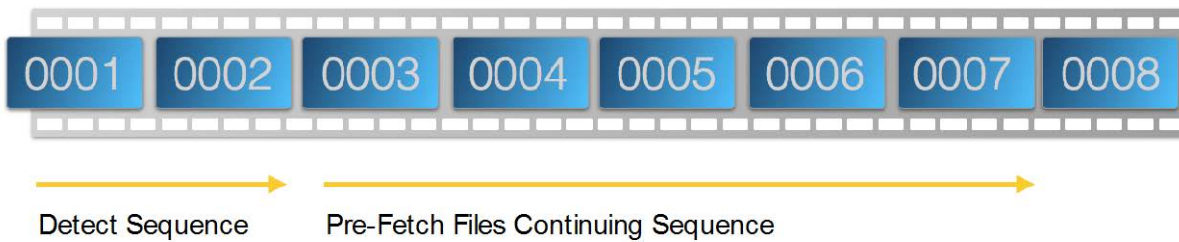
Overview

Cluster-wide FileName PreFetch can be enabled to optimise the streaming performance of OneFS when working with image sequences. Consideration should be given to other workflows hosted on the same cluster, and the impact of possible *false fetches* (where resources are used pre-fetching files that are not ever requested by the client) should be evaluated.

If Adobe Premiere Pro is being used to work with image sequences, then improved performance may be achieved by enabling FileName based PreFetch. Where image sequences are not used in the environment, FileName based PreFetch should not be enabled.

Operation

FileName PreFetch enables a performance optimisation by detecting when image sequences are requested by a client. When a sequence is detected, OneFS will pre-fetch files from the underlying storage units (disc drives or SSDs) before they are requested.



FileName PreFetch concept. Note, not actual algorithm,

The FileName PreFetch algorithm is optimised to detect image sequences with either decimal or hexadecimal filename numerical increments.

Enabling

Filename Pre-Fetch can be enabled across the cluster at the command line of OneFS. A detailed overview and configuration guide is available at:

<https://dell EMCevents.com/uploads/Dell-ECM-Isilon-Filename-Based-Prefetch.pdf>

Further Information

For detailed guidance on File Pool Policies and data layout and access strategies, check:

<https://www.emc.com/collateral/hardware/white-papers/h10719-isilon-onefs-technical-overview-wp.pdf>

Guidance for using the command line to make administrative changes is available at:

<https://www.emc.com/collateral/TechnicalDocument/docu84280.pdf>

Guidance for using the web interface to make administrative changes is available at:

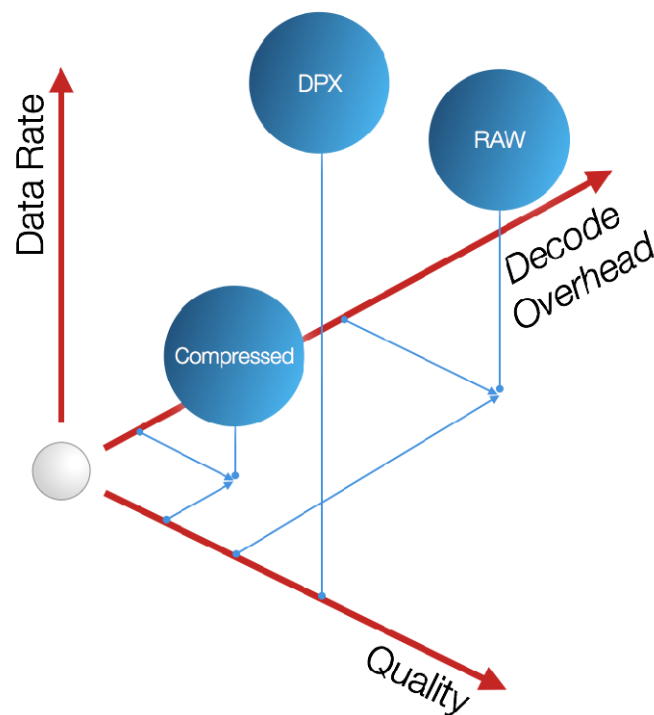
<https://www.emc.com/collateral/TechnicalDocument/docu84277.pdf>

Video and Audio Codec Choice

The choice of video and audio codec can have an impact on the performance of the application. Different codecs have different benefits, and present different challenges to each part of a system. Fundamentally, there are three key parameters - and a system can be optimised for any two, at the expense of the third.

- Data Rate
- Encode and Decode Overhead
- Image Quality

For example, an uncompressed DPX sequence is very high quality and has a very low decode overhead, but it has a relatively high data rate. A high quality XAVC clip will have a relatively low data rate, but a much higher decode overhead.



Quality, Data Rate and Decode Overhead Comparison.

Whichever codec is selected to be used, it should be noted that Adobe Premiere Pro uses uncompressed audio. If the audio that is encapsulated in the codec is compressed, the application must decompress the data before it can be used. In some environments, therefore, performance gains may be realised by configuring the system to create and work with uncompressed audio.

Adobe Premiere Pro Configuration and Optimisation

General Configuration

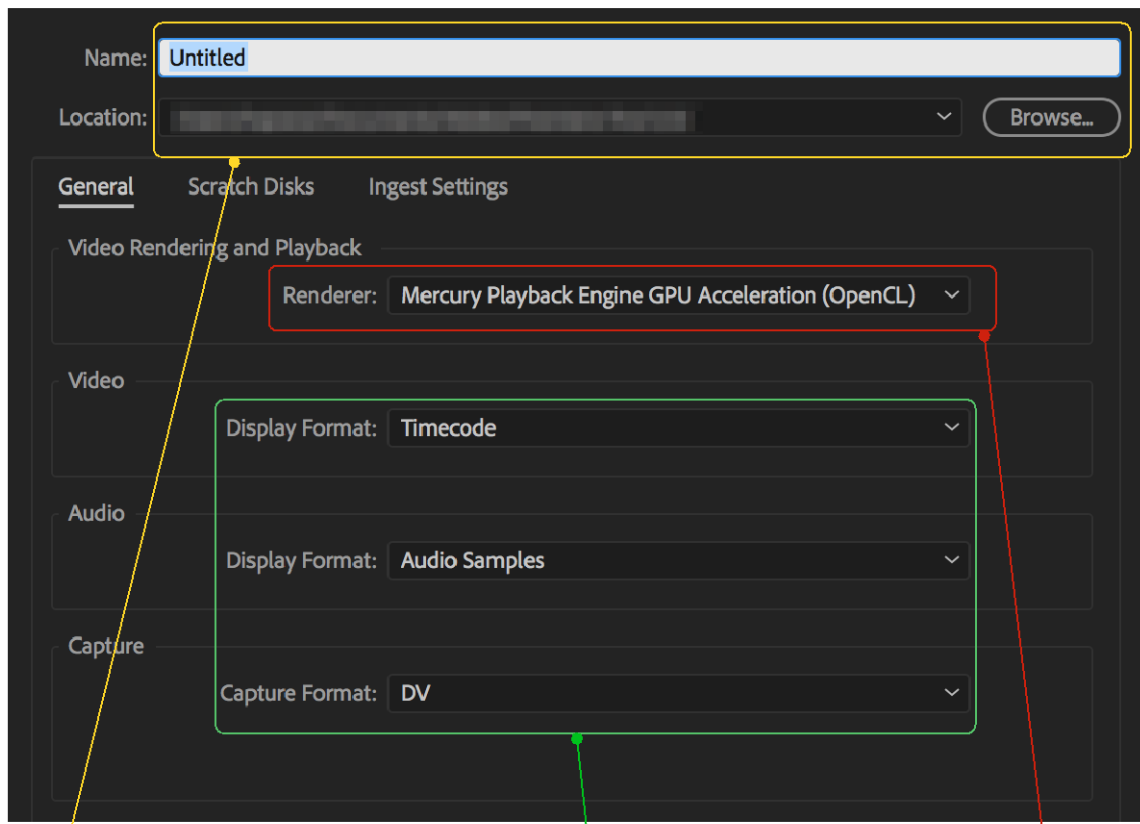
The Adobe Premiere Pro Project Settings panel allows the user to affect various aspects of the application in order to make optimisations. Access the settings panels from the Project Settings menu selection.

When a new Project is created by the user, a dialog invites the user to specify its target location. For most collaborative environments, it is most appropriate to select a location on the Isilon shared storage.

The location on the Isilon shared storage should be protected by using standard authentication and authorisation methods (for example, Active Directory binding, and Access Control Lists). For example, a System Administrator could:

- In a shared collaborative environment, create a directory or share on the Isilon shared storage, and assign read/write privileges to all required users or groups.
- In a private environment, create a directory or share on the Isilon shared storage that is assigned only to a specified user or group.

In all cases, the System Administrator would create the directory or share, and advise the user to select that location when choosing where to create the new Project.



Set the project name according to a strictly defined naming convention, and target a directory on an Isilon SMB share.

In most cases, using GPU acceleration is recommended.

These options do not normally materially impact the way the application interacts with storage.

The General Panel

When multiple projects are saved to a shared storage, it is of critical importance to design and implement a strict naming convention - so that naming collisions are avoided and projects can be found in the future.

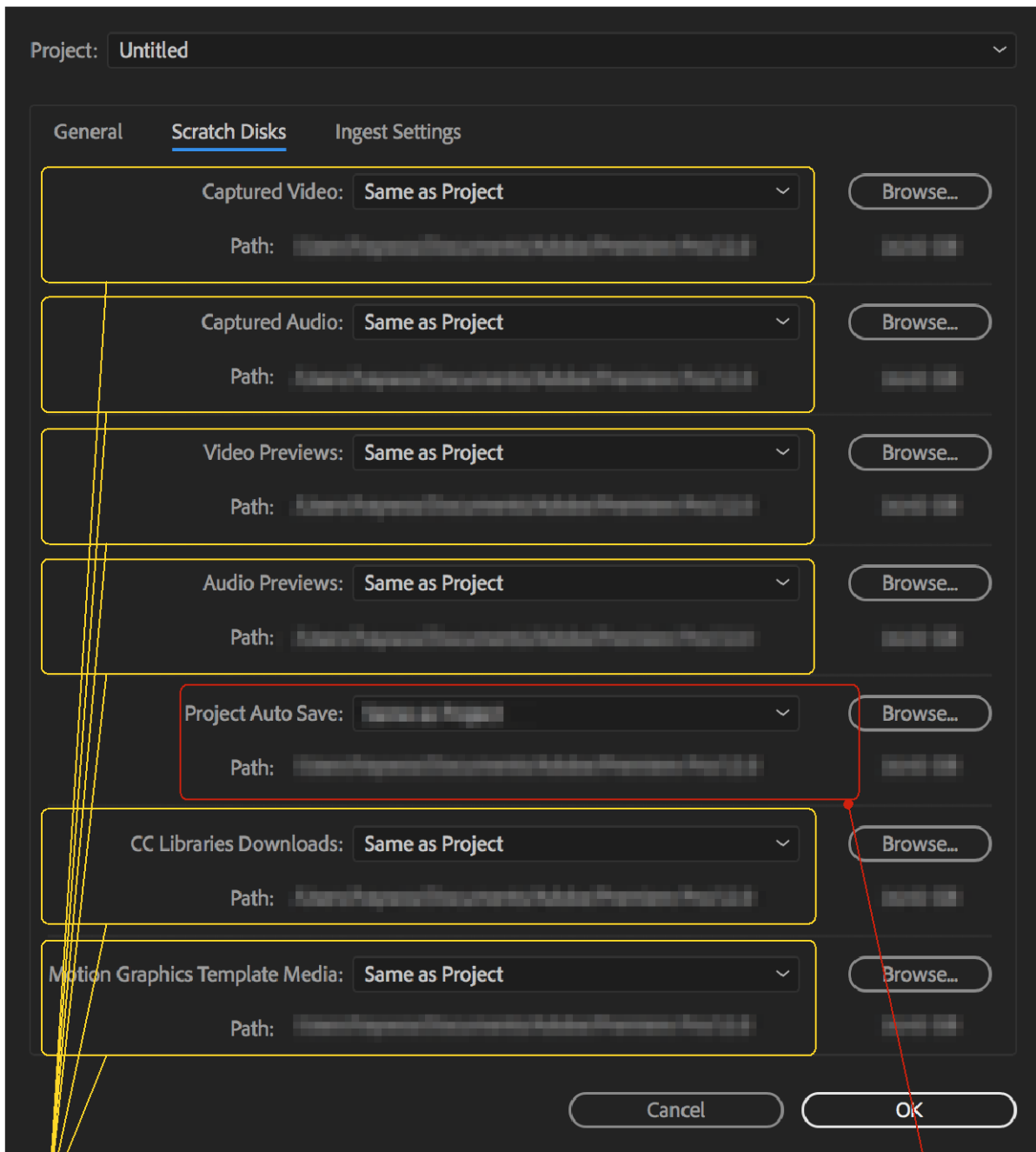
Scratch Disks

When a new project is created, Adobe Premiere Pro will default to writing most files in sub directories of the file path of the project. However, for optimal working with Isilon shared storage, some of the paths may be adjusted.

The Adobe Premiere Pro application allows the user to target different storage paths and volumes when writing different files. When working in a collaborative environment, for most settings, it is usually most appropriate to target the same location as the project, on the Isilon shared storage.

However, the one exception is that it is usually advisable to target the *Project AutoSave* backup to the local storage of the client machine for the most robust and resilient way to ensure data protection.

Sub Menu Item	Suggested Location
Captured Video	<i>Same as project</i> (on Isilon shared storage)
Captured Audio	<i>Same as project</i> (on Isilon shared storage)
Video Previews	<i>Same as project</i> (on Isilon shared storage)
Audio Previews	<i>Same as project</i> (on Isilon shared storage)
Project AutoSave	Workstation Local storage - This is where the project backup is auto-saved
CC Libraries Download	<i>Same as project</i> (on Isilon shared storage)
Motion Graphics Template Media	<i>Same as project</i> (on Isilon shared storage)



Set to "Same as Project" - an SMB share path on Isilon Storage

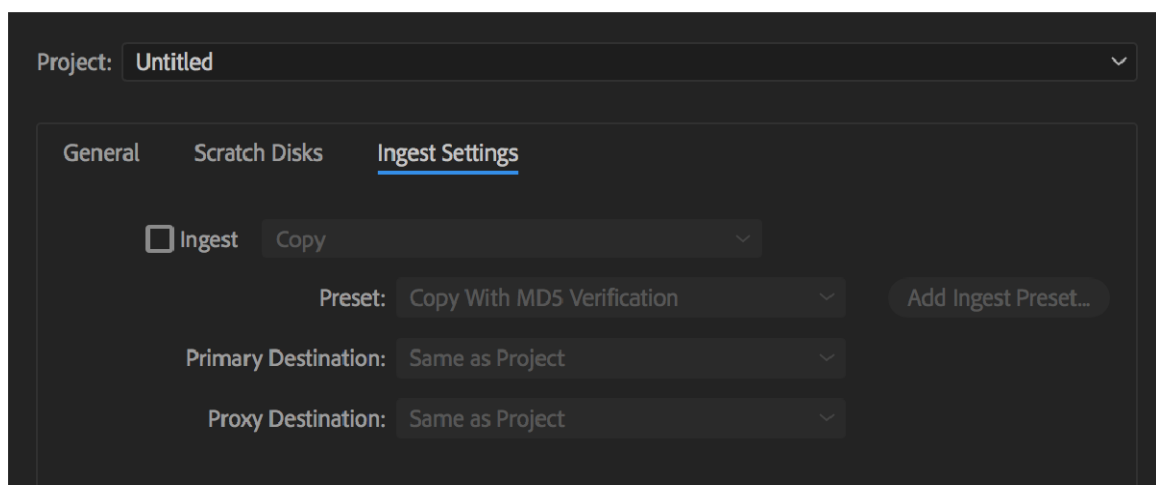
Project Auto Save: set to a local path

The Scratch Disks Panel

Ingest Settings

The Adobe Premiere Pro Ingest settings affect the way that the application deals with media that is imported by the user.

- If media is written to the Isilon shared storage by some other device or process (for example, live capture devices, or MAM solutions from partner vendors), then that media should be used “in place”, and the *Ingest* option should be de-selected.
- If media is to be brought into the environment from an external source (for example, a USB key or camera card) then selecting the *Copy* option will copy the media to a specified source. - using MD5 verification will consume more system resources, but will confirm the validity of the copy.
- When selecting the *copy* option, it is often best practice to select the *Primary Destination* (and *proxy destination*, if used) to be the *same as project*.
- Selecting *Transcode* - will consume more system resources, but may be desirable if the source material comes from multiple sources in different formats.



Adobe Premiere Pro Ingest Settings.

Application Preferences (settings)

The Adobe Premiere Pro Application Preferences can be adjusted to vary the behaviour of the application, and affect its interaction with the storage. In particular:

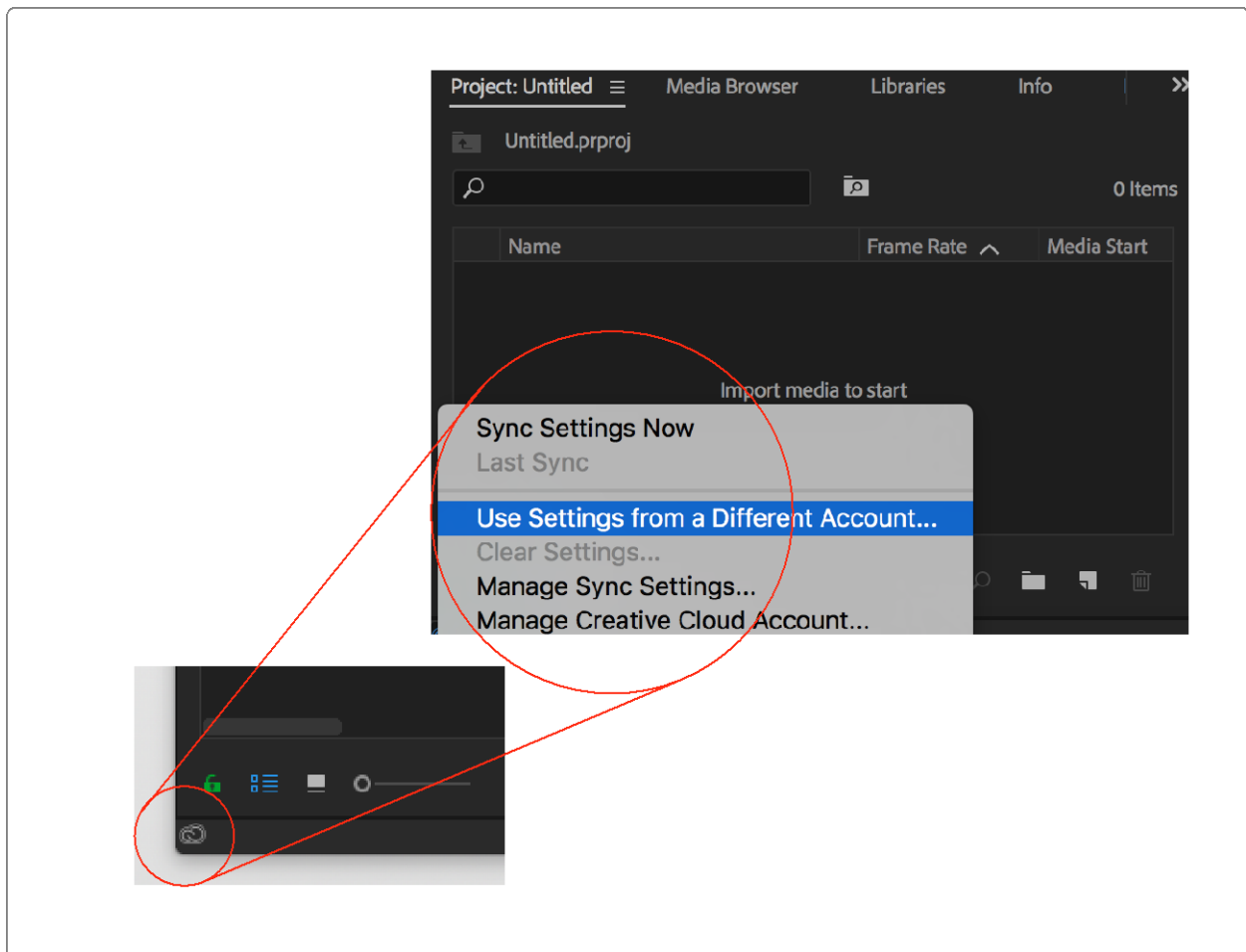
- The application may be set to limit the creation of some files and therefore not consume so many system resources - if the benefit of that particular feature of the application is not important for the workflow.

- The application may be set to target different file paths (or volumes) for different filesystem interaction. This allow System Administrators to configure storage in the most optimal way.

The application settings may be set on each client, and stored locally as part of the configuration for the logged-in user. Alternatively, the settings may be stored as part of the configuration for the Adobe Creative Cloud account for the logged-in user.

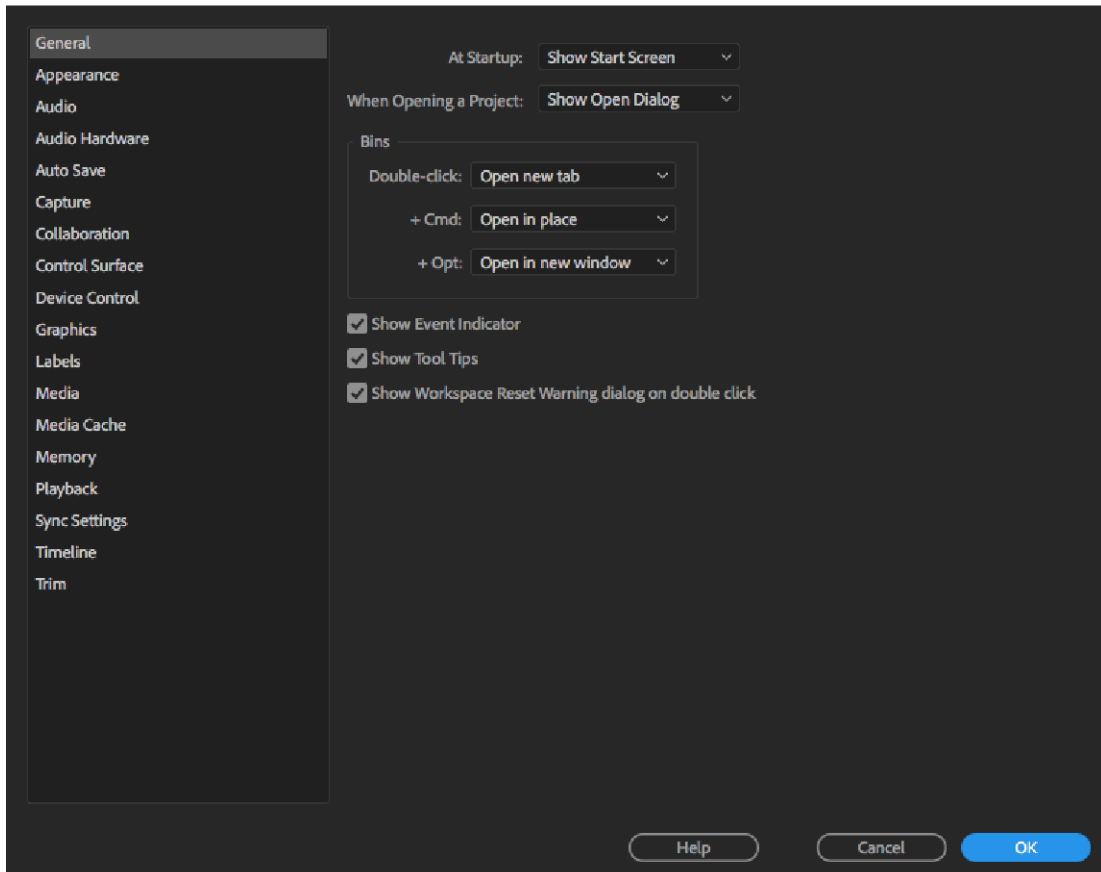
Finally, it is possible to store the optimal settings in a single “master” Adobe Creative Cloud account, and for each logged-in user to download and use those settings in preference to their own. This is a particularly useful feature for large organisations with multiple users working in a collaborative environment.

The settings may be downloaded from the “master” Adobe Creative Cloud account by clicking the small Creative Cloud logo at the bottom left of the application window.



Using settings from a master Adobe Creative Cloud Account

To access the settings, select the Settings or Preferences menu option.



Adobe Premiere Pro Settings Panel

Some (but not all) of the settings affect the way that the application interacts with the storage.

General

The settings in the *General* sub-menu do not materially impact the interaction of the application with the storage.

Appearance

The settings in the *Appearance* sub-menu do not materially impact the interaction of the application with the storage.

Audio

Audio waveforms are a visual representation of audio, and are overlaid on audio tracks on the timeline. The creation of the waveforms has been observed to consume processor overhead and storage bandwidth, and Adobe Premiere Pro provides a configuration option to specify at what time the waveforms are created.

When enabled, Automatic Audio Waveform Generation will create audio waveforms automatically in the background:

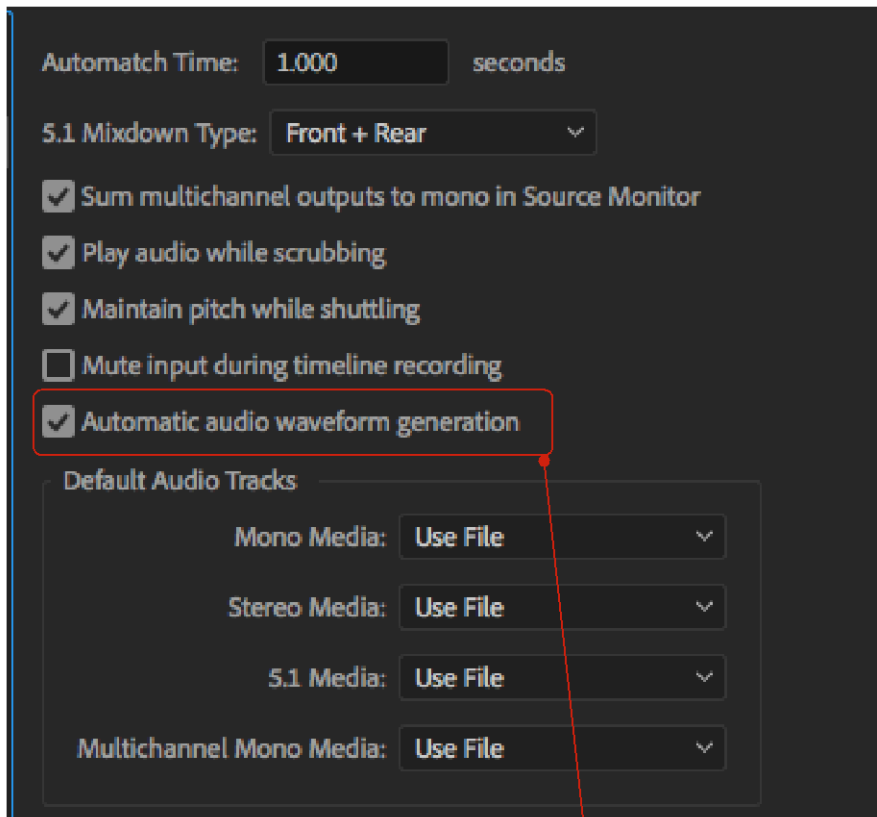
- When a file is first imported to the project, or
- When a new project containing existing audio assets is first opened on a user's system.

When the option is de-selected, audio waveforms will not be generated for an audio asset until that asset is played or scrubbed, or where the creation of the waveforms is requested by the user via the *Generate Audio Waveform* option in the *Clip* menu.

When waveforms are generated automatically, system resources are consumed “up front”, and in advance of the waveforms being required. Where the waveforms are not generated automatically, system resources are consumed at the point of first accessing an audio asset.

The optimal setting for any particular environment, project or user will depend on the nature of the project, the number of audio assets in the project, and the available system resources. It is recommended to consider the most optimal setting for every situation.

Audio waveforms are stored as `.pek` files in a location specified in the Media Cache settings detailed later in this document.



Selecting or disabling Automatic Waveform Generation changes the time at which waveforms are generated.

Automatic Waveform Generation.

Other settings in the *Audio* sub-menu do not materially impact the interaction of the application with the storage.

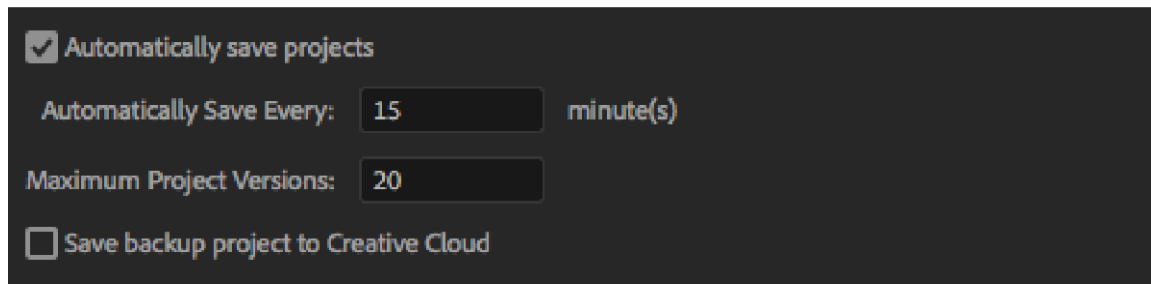
Audio Hardware

The settings in the *Audio Hardware* sub-menu do not materially impact the interaction of the application with the storage.

Auto Save

Adobe Premiere Pro may be configured to auto-save projects as the user is working. The target location for the auto-save is configured separately (see above in the “Scratch Disk” settings panel). However, the feature is enabled and the frequency is set in the *Auto Save* sub-menu:

- Set the auto-save interval according to personal preference. A smaller interval will result in more granular roll-back points, but will consume more system resources during the saves.
- The Maximum number of Project Versions limits the number of roll-back points that are saved. Increase the maximum to save a longer history, but be aware that doing so will consume more system resources.
- A “tier 2” or “second level” backup of the project in its most current state may be made to the user’s Adobe Creative Cloud account, by ticking the check-box. Enable according to personal preference, but be aware that this option requires consistent and reliable internet connectivity.



Enabling Autosave, and setting frequency.

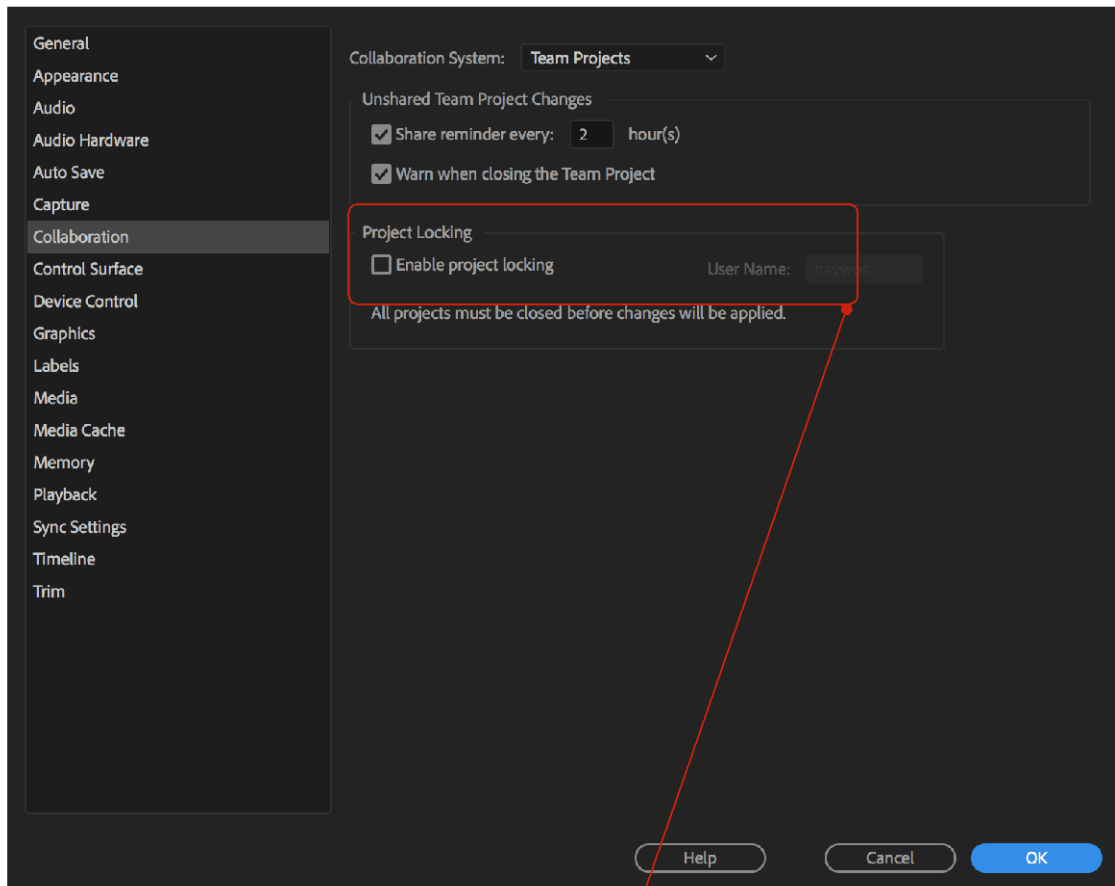
Capture

Whilst the Adobe Premiere Pro capture functionality does write data to the storage, the options in the *Capture* sub-menu do not materially impact the interaction of the application with the storage.

Collaboration

The options in the *Collaboration* sub-menu relate to both Adobe Premiere Pro Team Projects, and Project Locking. Guidance relating to Team Projects is outside of the scope of this document at the time of publication, but may be updated and included in future updates of this document.

In a simple collaborative environment (where there is no Media Asset Manager, and where Adobe Team Projects is not being used), it is advised that Project Locking is enabled to avoid corruption and loss of work.



Enable Project Locking in a collaborative environment.

Enabling Project Locking

Control Surface

The settings in the *Control Surface* sub-menu do not materially impact the interaction of the application with the storage.

Device Control

The settings in the *Device Control* sub-menu do not materially impact the interaction of the application with the storage.

Graphics

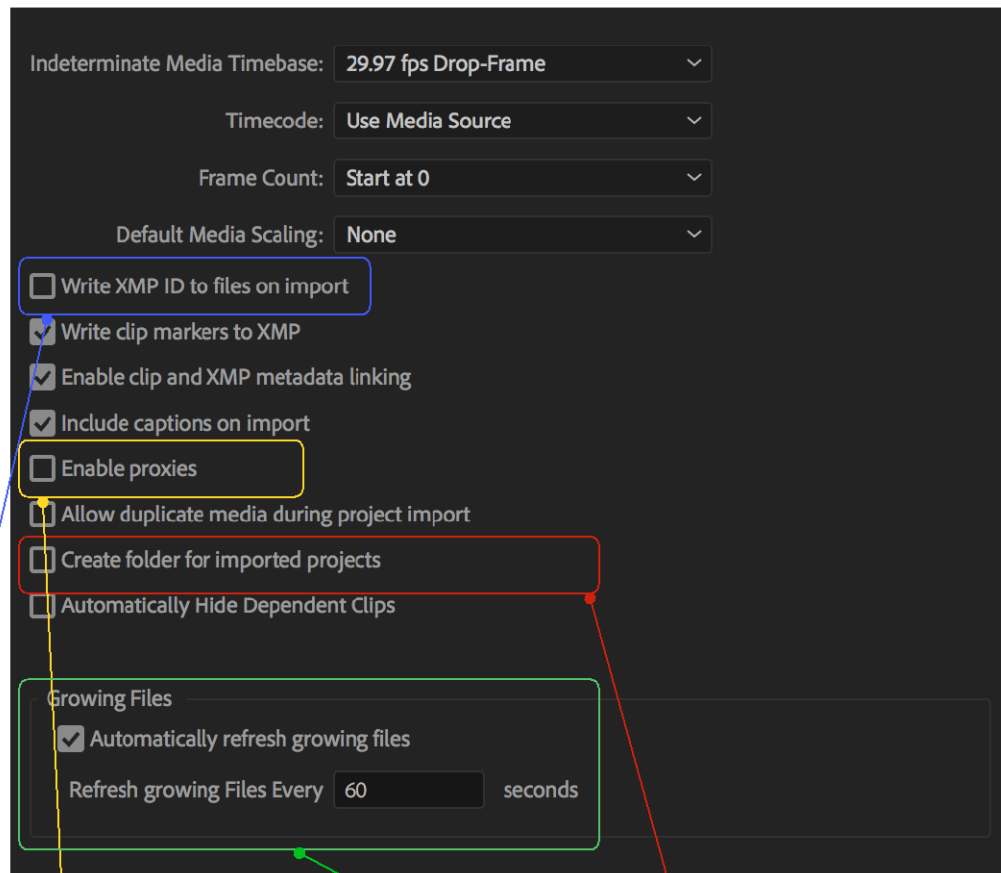
The settings in the *Graphics* sub-menu do not materially impact the interaction of the application with the storage.

Labels

The settings in the *Labels* sub-menu do not materially impact the interaction of the application with the storage.

Media

- In a collaborative environment, the setting to *Write XMP ID to Files on Import* should be disabled. If enabled, existing media cache files may be invalidated or corrupted if accessed by multiple users.
- Adobe Premiere Pro is able to generate proxies. Working with proxies may be useful if the demands of the workflow cannot be supported by the environment - for example if the user requires to work with high resolution or high frame rate material on a system that was not originally designed or specified to support it. Generating proxies consumes system resources, and should be only enabled as part of a managed proxy workflow.
- Create folder for imported project - leave to “off” to save drive space.
- Growing Files: Adobe Premiere Pro supports working with growing files that are being written by another application. Workflows of this type are particularly common in collaborative environments, where media is often written by live capture devices or from central ingest stations. The frequency at which the application updates the clip whilst it is on the timeline may be set here. Reducing the frequency may allow the user to work much “closer to the wire”, but may consume more system resources.



Disable *Write XMP ID to files in import* in a collaborative environment.

Enable proxy generation only when required by the workflow.

Enable folder creation only when required by the workflow.

Enable growing file refresh for realtime collaborative workflows.

Adobe Premiere Pro Media Settings

Other settings in the *Media* sub-menu do not materially impact the interaction of the application with the storage.

Media Cache

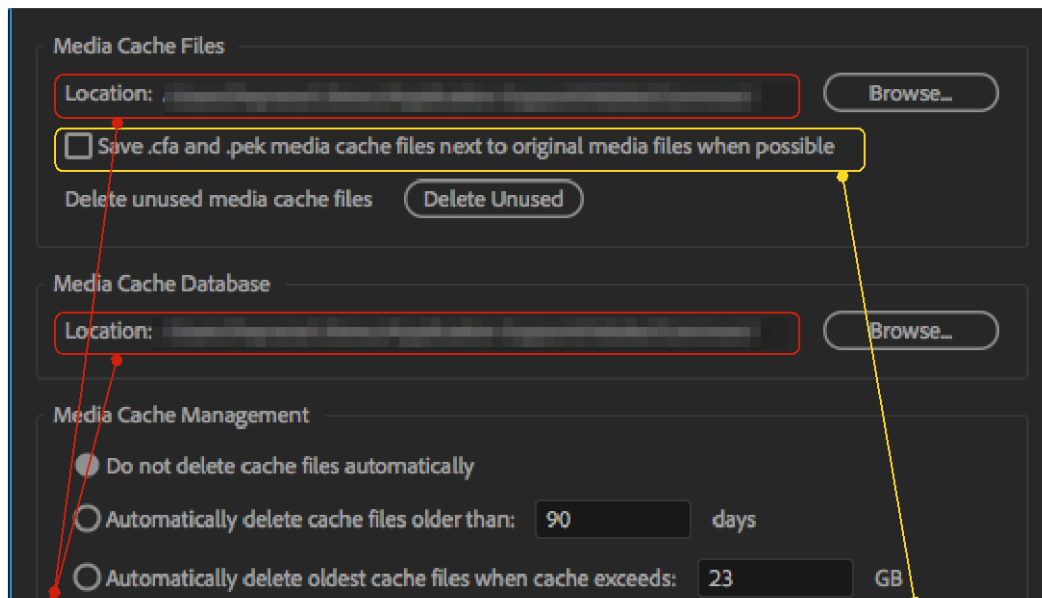
Adobe Premiere Pro creates multiple files in the background to support the application. In particular, media cache files (also known as accelerator files) are created, so that performance of the application is enhanced.

Even in collaborative environments, the media cache files should not be shared between users or workstations, because file access collision and corruption may occur. Adobe Premiere Pro can access the cache files thousands of times per second, the files should be targeted at high performance storage with low latency access.

In some environments – particularly if the workstation has a large and fast local storage device – it may be most appropriate to target the cache files at local storage.

If there is limited local capacity, or if portable working (where a user may use different machines during the course of working on the project) is required, it may be most appropriate to target the cache files at the Isilon shared storage. In this configuration, careful consideration should be given to the performance and latency requirements:

- Consider the impact on the system, and the capability of the full infrastructure (including networking) of high frequency file access.
- A directory structure should be created on the Isilon shared storage that assigns a separate directory for each user and workstation. The cache files from different workstations should not be targeted at the same directory.
- When using Hybrid Isilon nodes, it may be most appropriate to pin the targeted directories to the node SSDs. In this configuration, careful consideration should be given to capacity management.



Select a location for the Media Cache files.

Deselect the option to target a location adjacent to the original media files.

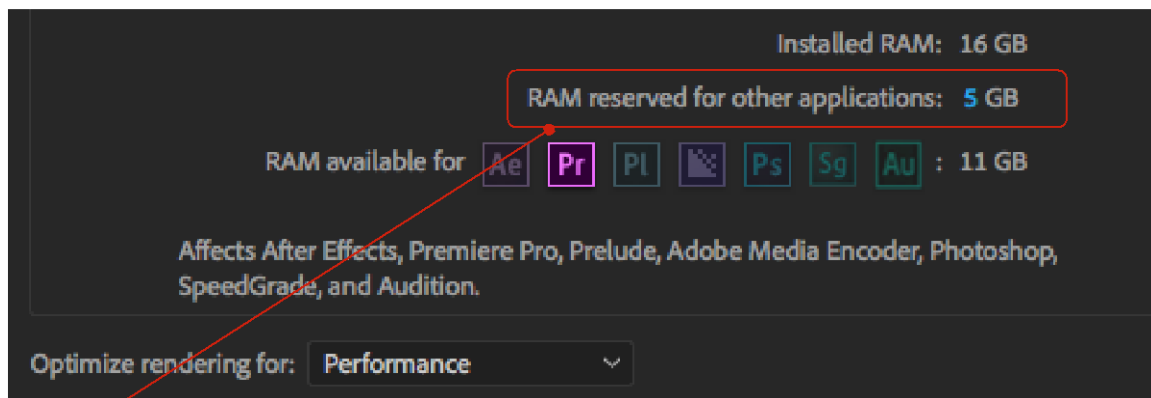
Media Cache File target location

Memory

The options in the *Memory* sub-menu sets the maximum amount of available RAM that the Adobe Premiere Pro application will be permitted to consume. The user is invited to reserve an amount of available RAM for use by all other applications that are running on the workstation.

Where the workstation is used only to support Adobe Premiere, it may make sense to reserve only a very small amount of RAM for other applications. If other applications are required to be active at the same time, then it may make sense to experiment with different settings.

Where Adobe Premiere Pro is permitted to consume more of the available RAM, the size of the application pre-fetch buffer may be permitted to grow - which in turn may deliver a more robust playback performance.



Set the amount of memory available to other applications, to limit the amount of memory available to Adobe applications.

Adobe Premiere Pro Memory Configuration

During initial configuration and optimisation, it can be useful to temporarily severely restrict the amount of available RAM that the application is permitted to consume - artificially forcing a smaller pre-fetch buffer - and exposing more clearly the effect of other optimisations.

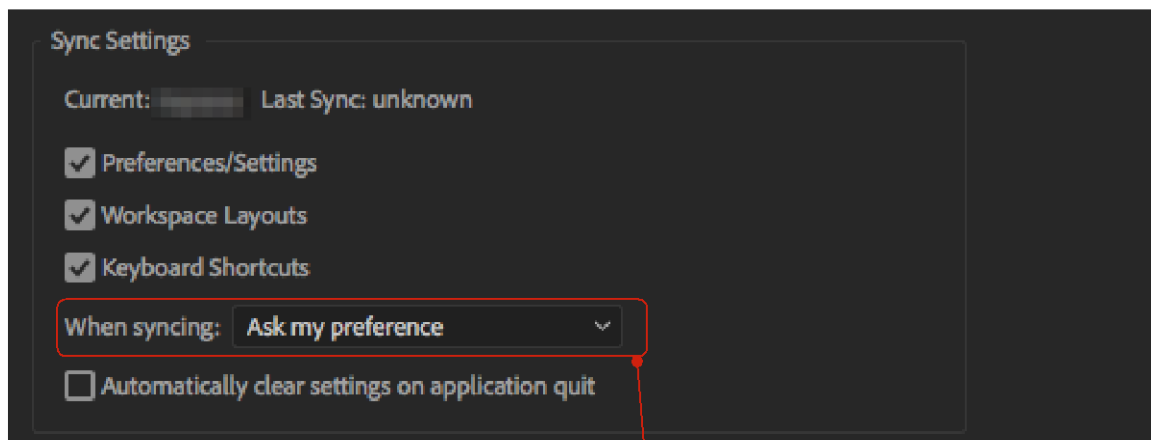
Selecting *Performance* as the option for *Optimise rendering for* will consume more of the available RAM, but will generally deliver better performance and playback stability.

Playback

Whilst the Adobe Premiere Pro playback functionality does read data from the storage, the options in the *Playback* sub-menu do not materially impact the interaction of the application with the storage.

Sync Settings

The options in the *Sync Settings* sub menu are related to the interaction of the application with the Adobe Creative Cloud. In particular, the option sets the behaviour of the application when updating and managing the preferences - and this may have an unintended impact on the application if settings are unexpectedly changed.



Set to "Ask my preference" to avoid unexpected changes.

Sync Settings

It is recommended that the option for *When syncing* be set to *Ask my preference* - to avoid unexpected settings changes.

Timeline

The settings in the *Timeline* sub-menu do not materially impact the interaction of the application with the storage.

Trim

The settings in the *Trim* sub-menu do not materially impact the interaction of the application with the storage.

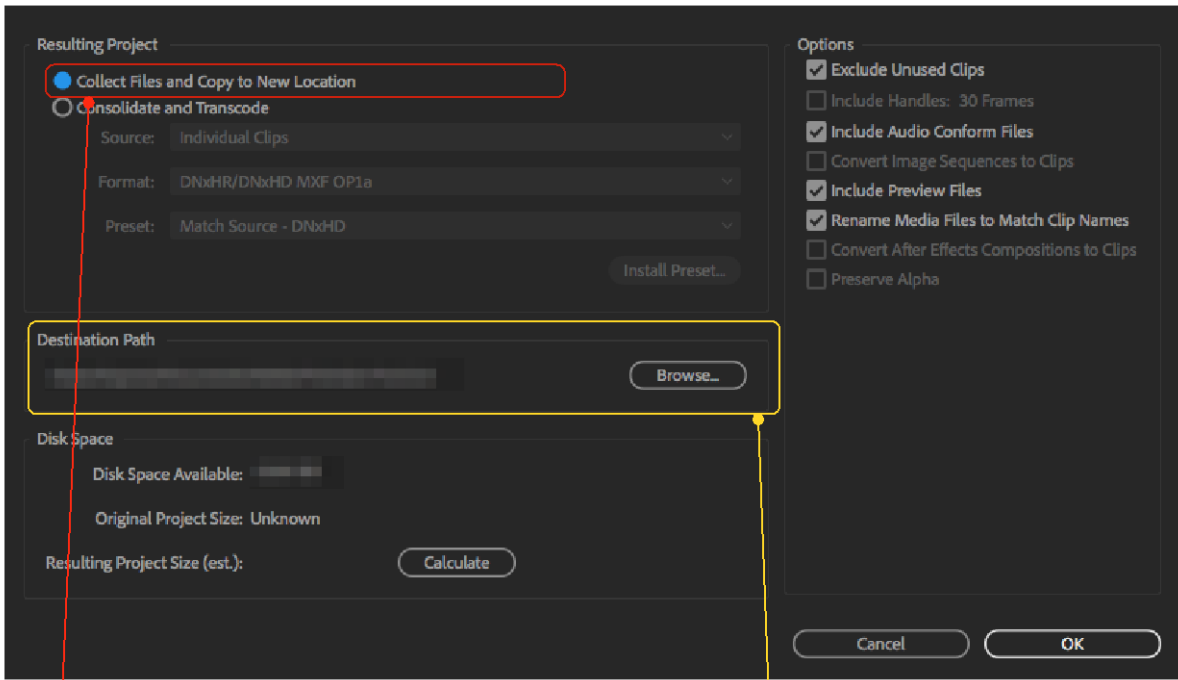
Project Manager

Adobe Premiere Pro may be used to manage the media on the Isilon storage – and this may be a useful feature for environments that do not have a Media Asset Manager. It is important to implement a workflow to clean up media and files once a project has been completed – to create space for future projects. There are two main approaches to project management using Adobe Premiere Pro.

- Use an automated process to move all files associated with a project to a new destination.
- Use an automated process to consolidate and transcode all files associated with a project to a new destination.

Where files are moved to a new destination, this may be a new directory or volume on a different SmartPools tier, or on a different Isilon cluster.

To make best use of available resources, and to preserve content in its original format and quality, it is recommended to use the “Collect Files and Copy to New Location” option.



It is recommended to select “Collect Files and Copy to New Location”

Select the target path for the files.

Adobe Premiere Pro Project Management