Get That Photo!

Defeat shutter lag,
Focus on the smallest details,
Make Super-wide Panoramas

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For PATACS + OPCUG
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Why is this subject useful to you?

- You will learn to take photos with greater success in some difficult situations, including very small and very large scenes.

- You will learn useful jargon, and you can communicate more effectively with a photographer.

- You will understand more about modern cameras and how they work.

Agenda

- Why an SLR camera is useful

- The causes of shutter lag, and an easy fix

- Depth of Field defined, and ways to use it

- Why close-up detail is often blurred

- The solution for great depth of field up close

- Subjects taller or wider than any lens

- The solution for tall/wide subjects

Most cameras

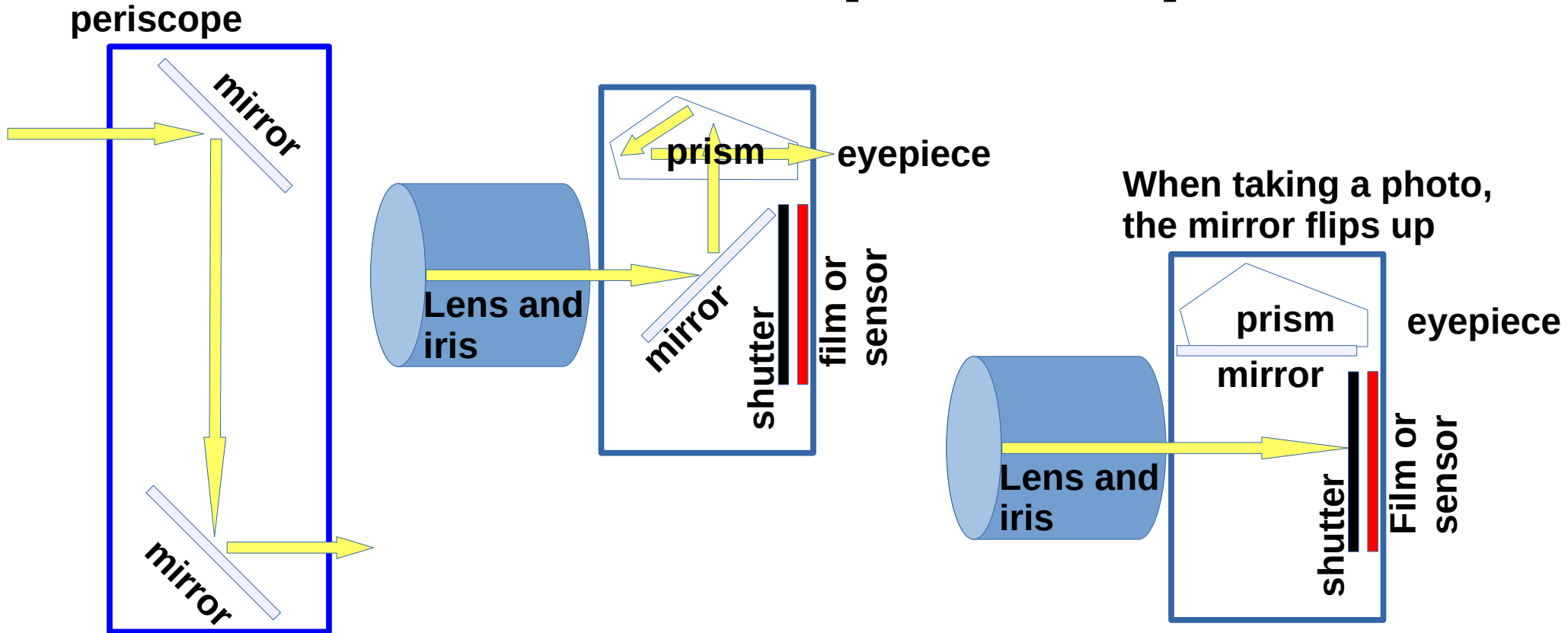viewfinder eyepiece

Lens and iris

shutter

Film or sensor
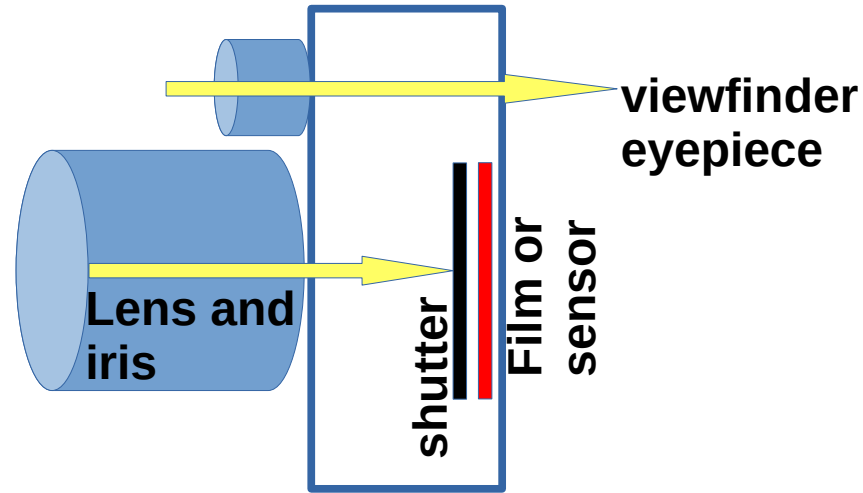
The camera lens and viewfinder lens are separated.

The photo does not capture exactly what the viewfinder shows to the photographer.

Various film cameras with the typical two lenses. The viewfinder lens is on top.

An SLR
resembles a periscope

periscope

mirror

mirror

Lens and iris

prism

eyepiece

mirror

shutter

film or sensor

When taking a photo, the mirror flips up

prism

eyepiece

mirror

Lens and iris

shutter

Film or sensor

Why a Single Lens Reflex (SLR) camera is useful

- An SLR shows through the eyepiece **exactly what the lens sees** and the photo will show, a major advantage.

- An SLR enables use of a **variety of lenses.** Changing the lens still allows the photographer to see through the lens.

- An SLR enables use of **zoom lenses.** Changing the focal length of the lens still allows the photographer to see through the lens.

My Photo Experience

- My first serious camera was a Yashica Twin Lens Reflex camera, in 1968.

- I took photos with a Pentax Spotmatic 35mm SLR and, later, a Pentax K1000 SLR from 1970 to 1999.

- The Pentax SLR was almost completely manual, with a through-the-lens (TTL) light meter to assist in exposure control.

- In 1999, I switched to a Canon Elan IIe SLR body and Canon lenses with a then-unique feature called **Image Stabilization**.

- The Canon SLR included **auto-focus** and **auto-exposure**, and introduced me to **Shutter Lag.**

Part 1. Shutter Lag and its remedies

The Roots of Shutter Lag

When you tap the shutter release button, automatic cameras have to do a lot of prep before taking a photo:

- Set **auto-focus**

- Set **auto-exposure** (3 parts: shutter speed, aperture size, and sensitivity aka ISO).

- Set **White Balance**, meaning the peak color of the ambient light or the the strobe flash, if you use it. This is unique to digital cameras; in film cameras, film dictates white balance.

- All of this work involves a great deal of complex automatic activity, and takes time.

# Unwanted effects of Shutter Lag

- Miss that moment when the toddler takes first steps

- Miss that moment when the graduate receives the diploma

- Miss that moment when the bride and groom emerge from the church

- Miss the soccer player's shot on goal

- You get the idea.

The simple way to avoid Shutter Lag

- The shutter release button has a **second position: halfway down**.

- At that position, the camera does all the automatic work and then **waits until you push the button all the way down**.

- When you do push the button all the way down, **the camera has no work remaining to be done** and takes the photo immediately.

- **Anticipate the critical moment.** Press the shutter release half way down, hold the button in that position until the moment arrives, then press it completely down.

Halfway down: How you can tell

- You can hear the lens elements move during auto-focus.

- The ISO setting, aperture setting and shutter speed setting appear **in the viewfinder** below the scene.
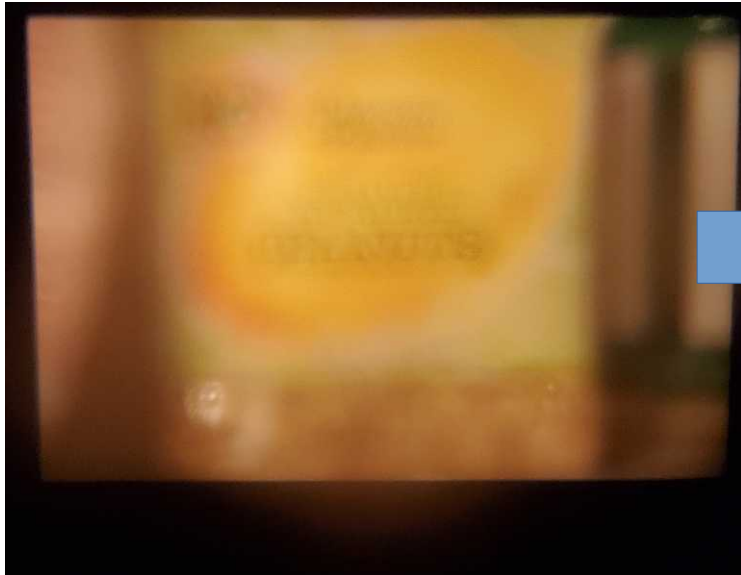
becomes

Photos of Canon EOS 7D mark II viewfinder

Another way to avoid Shutter Lag

- The cause of shutter lag is automatic workload.

- **Set some of the camera settings manually** in advance, to *reduce the camera's automatic workload.*

- I typically set: White Balance, aperture size (aka f/stop), and sensitivity (aka ISO). I let the camera choose shutter speed.

- I find **auto-focus** to be especially useful, so I use that for most subjects.

Motor Drive mode

- In this mode, the camera shoots photos as long as you hold down the shutter button, or until the camera runs out of memory buffer space.

Part 2. Capture tiny subjects in detail via Focus Stacking

Depth of Field (DoF)

- In front of the camera lens, there is a range of distances in which objects will be in focus, known as **Depth of Field**.

- *You can control that range.*

- Shallow DoF:

- Wide DoF:

How to Control Depth of Field

- Three factors affect Depth of Field

- **Distance from the subject:** distant subjects have greater DoF, closer subjects have far less DoF

- That is why so many close-up photos depict a relatively flat subject, with all details roughly equidistant from the lens

- **Focal length of your lens**: longer focal length decreases DoF, shorter focal length increases DoF

- **Aperture size (f/stop)**: tinier aperture size increases DoF, bigger aperture size decreases DoF

Examples of Close-ups

Examples of Close-ups
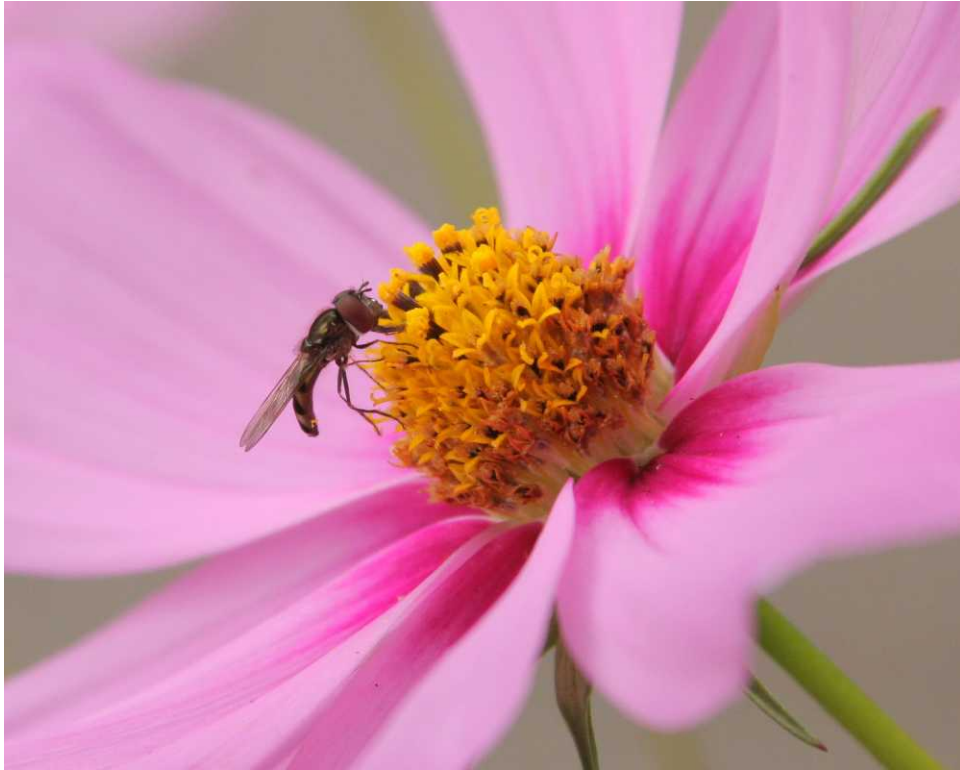
Examples of BOKEH
Points of light in back, out of focus

125mm lens, aperture: f/16

50mm lens, aperture: f/2

Make a chain-link fence disappear
Asian crane at Richmond Zoo, April 2015

8-foot-tall chain-link fence between camera and subject; 300mm lens, aperture f/11

400mm lens, aperture f/6.3: MUCH LESS DoF; fence is out of focus

Sometimes the subject is too small

Aperture: f/9

Depth of Field for a Close-up

- Can be increased dramatically by **Focus Stacking**

What is Focus Stacking?

- Shoot a group (or "stack") of photos of a single subject

- Vary the focus slightly in each of the photos, so that every part of the scene is sharply focused in one or another of the photos.

- This technique requires manual focus. Turn off auto-focus.

- Lenses and manual focus are not ideally suited to tiny focus adjustments at close range. Be patient.

- Computer software analyzes the photos, identifies the in-focus part of each photo, and then combines all the in-focus parts to produce a single photo with superior DoF.

Several software applications offer Focus Stacking

- I pay $10 per month to use Adobe PhotoShop on my desktop and laptop computers.

- **Other commercial focus stacking applications include**
  Helicon Focus,
  Zerene Stacker,
  ON1 Photo RAW 2021

- **Free Open-Source focus stacking applications include**
  CombineZP *has not been updated since 2012*,
  ImageJ *for Mac, win, Linux, updated July 2021*,
  Picolay *for Win* updated May 2021,
  Chasys Draw IES

Focus Stacking photo technique

- Shoot identical photos with a slightly altered focus in each, for instance one photo for each ornament.

- **Lighting** should be constant, unchanging.

- Use **manual focus**. Turn off auto-focus.

- **Set exposure manually**, so that it does not change from one photo to the next.

- **Use a tripod** to keep the camera in place.

- **Use a shutter release cable** so your hand does not shake the camera.
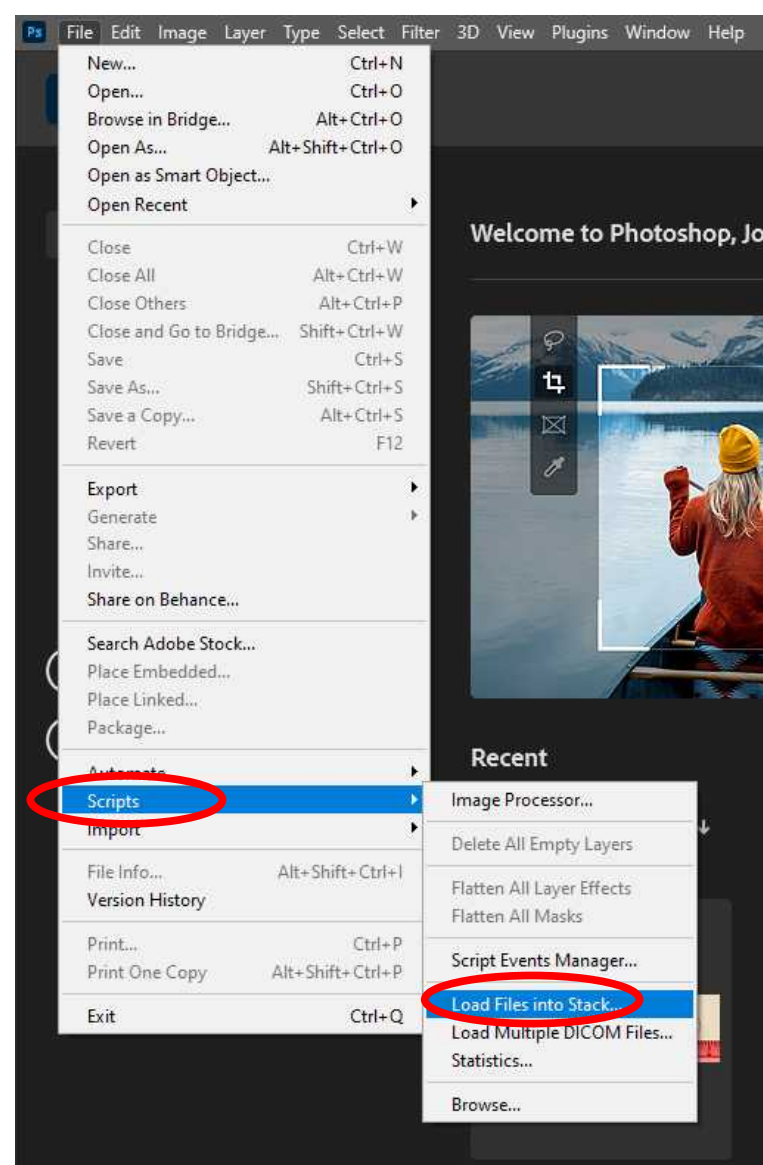
Focus Stacking Example

Photo #1

Photo #5

Photo #8

Focus Stacking using Photoshop

Step 1: Open the image files

- Open the Photoshop **File menu.**

- In the menu, select the **Scripts** choice. A sub-menu appears.

- In the sub-menu, select the **Load Files into Stack** choice.

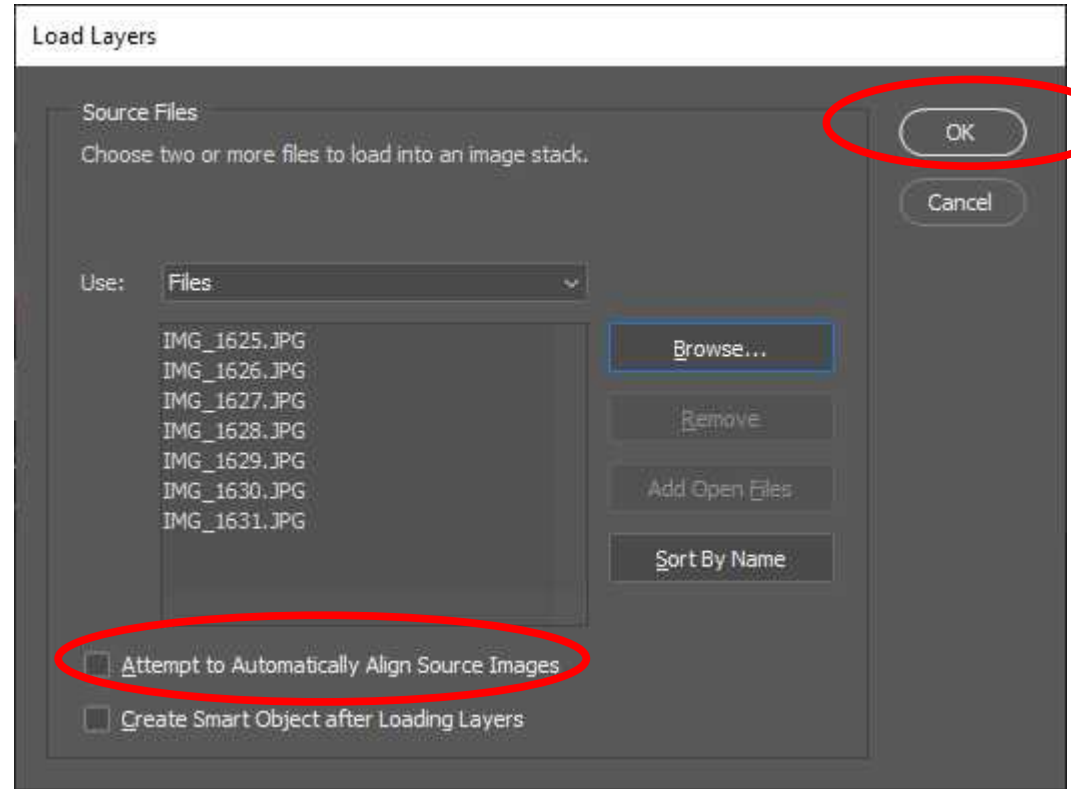- The **Load Layers** dialog window opens.

Images captured from Adobe Photohop version 22.4.2

The Load Layers dialog window

- Click the
  Browse button

- A Windows standard
  Open Files dialog box opens

- Choose the group of
  image files you want to load

- Click the Open button

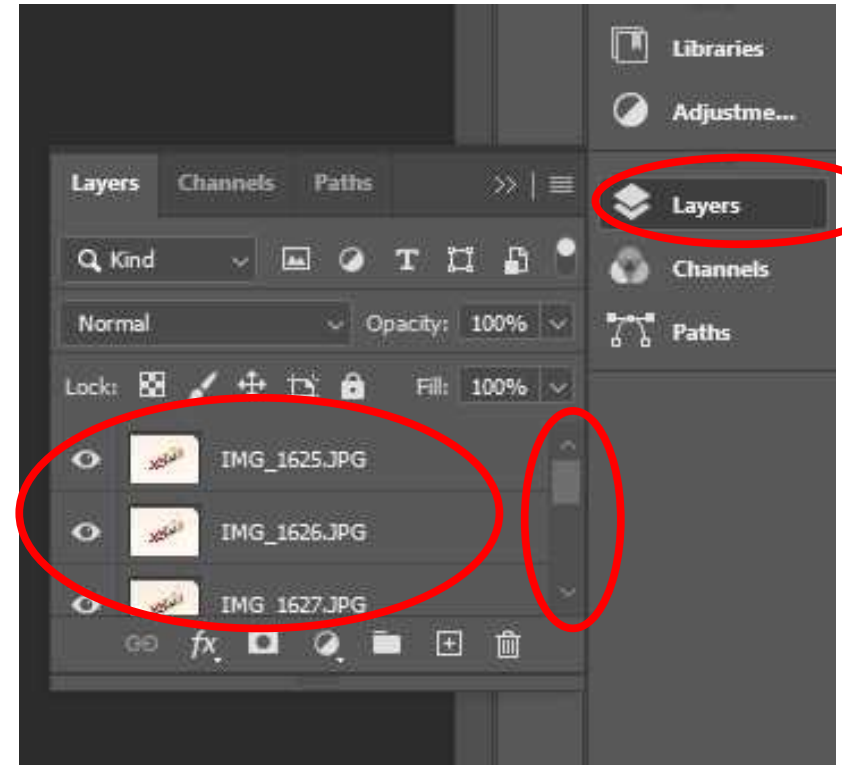- The Open Files dialog
  box closes.
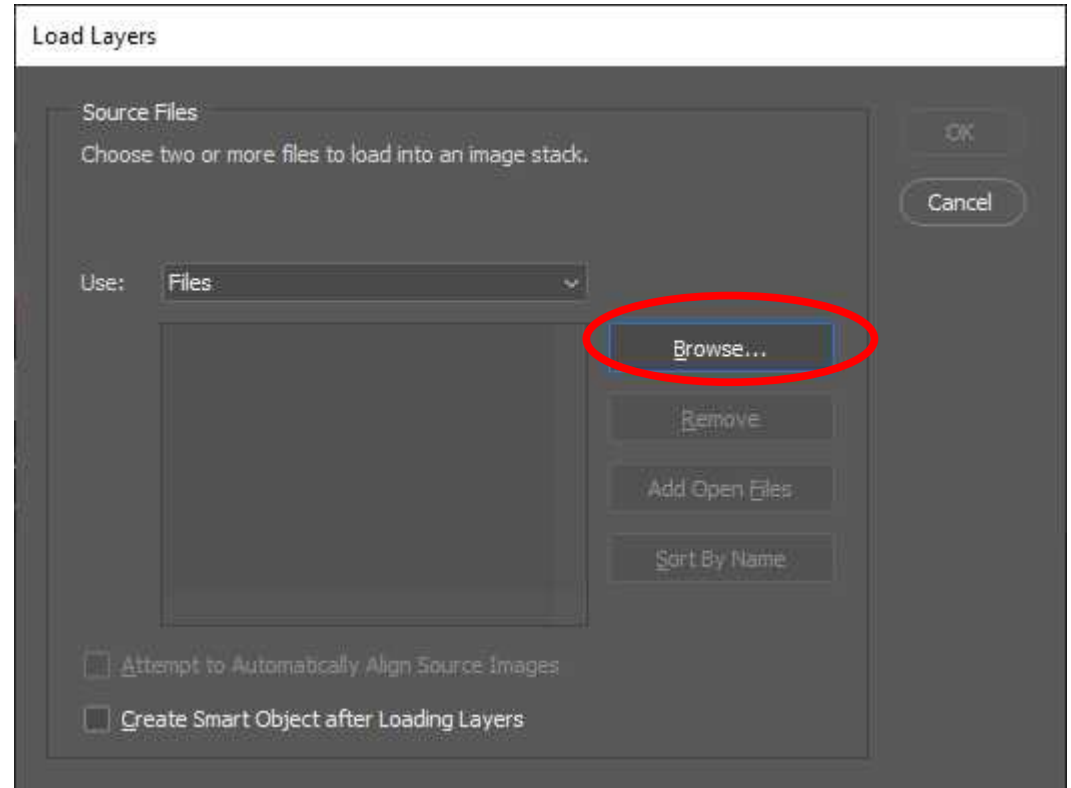
The Load Layers dialog window

- The chosen file names appear in the **Load Layers** dialog window.

- Click the **Attempt to Automatically Align Source Images** box.

- Click the **OK** button.

- The **Load Layers** window closes.

Load Layers

Source Files
Choose two or more files to load into an image stack.

OK

Cancel

Use: Files

IMG_1625.JPG
IMG_1626.JPG
IMG_1627.JPG
IMG_1628.JPG
IMG_1629.JPG
IMG_1630.JPG
IMG_1631.JPG

Browse...

Remove

Add Open Files

Sort By Name

☐ Attempt to Automatically Align Source Images

☐ Create Smart Object after Loading Layers

Photoshop initially shows only the first image

- All the other images are in other **layers**.

- Click the **Layers** button on the right border of the Photoshop window.

- The **Layers palette** appears.

- The Layers palette includes a **list of the image files, one per layer.**

- The **scroll bar** on the right lets you scroll the list up and down.

Optional step:
Save the layer stack

- Photoshop can save the layer stack in a PSD file or a TIFF file.

- In the Photoshop **File menu**, select the **Save As** choice.

- The Save Files dialog window includes the option to choose a file type.

Step 2: Blend the layers

Two general sub-steps:

- Select all layers.

- Tell Photoshop to blend the selected layers.

Step 2: Select all layers

- In the **Layers palette**, click on the first layer listed. That layer should turn gray.

- Hold down the Shift key.

- Using the scroll bar, scroll to the last layer.

- Still holding down the Shift key, click on that last layer.

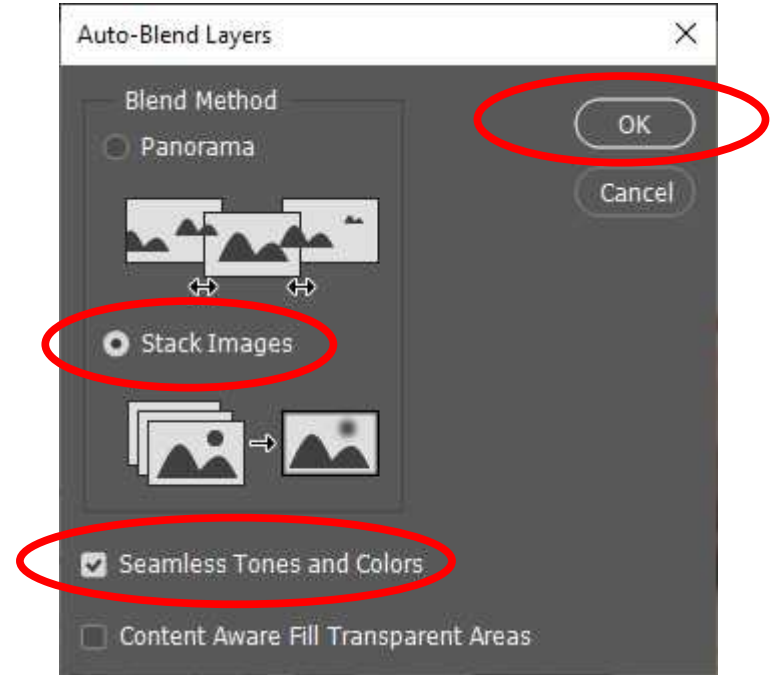- All layers should appear in gray.

- Release the Shift key.
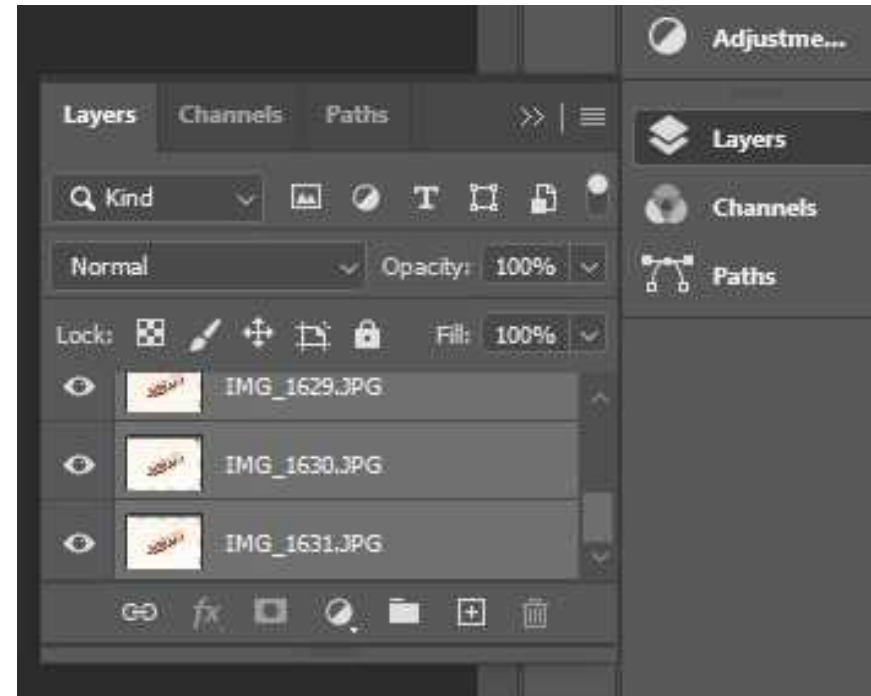
Step 2: Blend the Layers

- Open the Photoshop **Edit menu**.

- In the **Edit menu**, select the **Auto-Blend Layers** choice.

- The **Auto-Blend Layers** window opens.
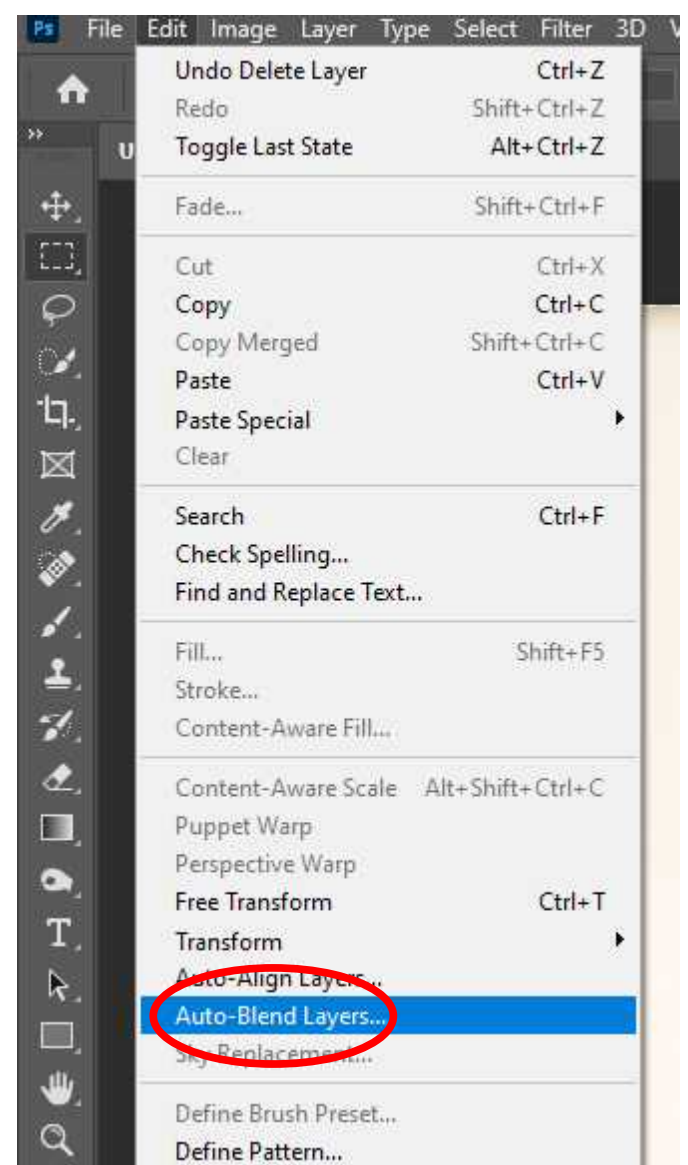
The Auto Blend Layers window

- Make sure **Stack Images i**s selected.

- Make sure **Seamless Tones and Colors** is selected.

- Click the **OK button**. The window closes.

Step 3: Flatten the layers

- Open the Photoshop **Layers menu**

- In the menu, select the **Flatten Image** choice.

- When the automatic work is done, the **Layers palette** will display exactly one layer, named **Background.**

- Every part of the subject should appear in focus.

- The original files are intact and unaffected.
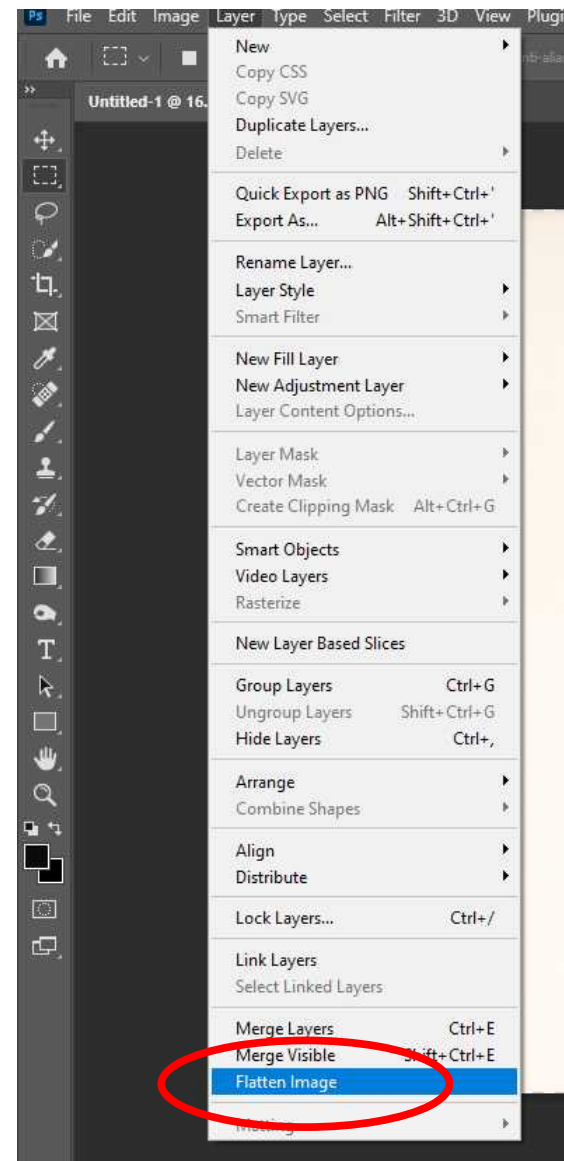
Done!

Focus-Stacking a 2" diameter coin

- 3 stacked photos: near edge, middle, far edge; all f/6.3

- 2" diameter coin

CNN.com article on focus stacking

- Appeared on August 31, 2021

- About a photographer who specializes in photos of nuts and seed pods

- He uses a fixed focus, and moves the camera towards the subject in millimeter increments

- Movement should change image size, so I think something else is being done to compensate for that change of image size.

- https://www.cnn.com/style/article/biss-hidden-beauty-seeds-photography-c2e-spc

Use the QR code

Part 3. Panoramas

Monschau, Germany

What is a panorama?

- Any scene that is wider, or taller, than a wide-angle lens can depict.

- This became popular in the early days of digital photography, when wide-angle lenses were unavailable.

- The computer technique to produce panoramas is far less expensive than a good wide-angle lens.

- A second advantage of this technique is that the panoramic image has **far more detail** and a **far higher pixel count** than any single photo taken using the same camera.

Take Overlapping Photos
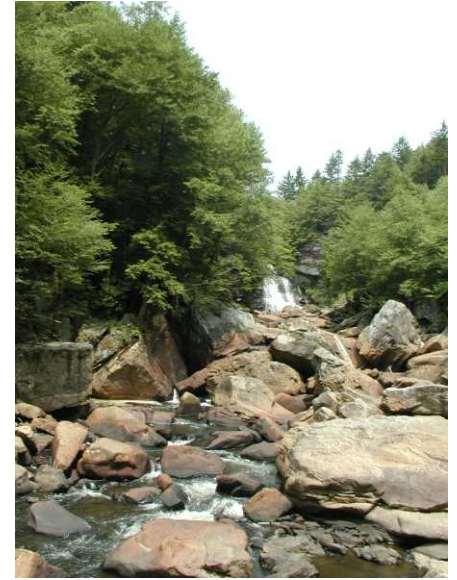
Photo technique

- Ideally, put camera on a level tripod. Overlap photos by roughly 20%.

- Note camera orientation was Portrait for this Landscape-oriented panorama.

- Set exposure manually and keep it constant for every photo.

- Set focus manually and keep it constant for every photo.

- Use a tiny aperture for great DoF.

- Use the longest focal length, meaning zoom as far in as possible.

Software creates a Composite Panorama

6-megapixel image, photos taken with a 2-megapixel camera
Software: Adobe Photoshop Elements

Charles River and Boston

- Seen from Memorial Drive in Cambridge

- 17 megapixels, taken with a 6-megapixel camera
- Software: Adobe Photoshop Elements

My largest panorama

- Great Sand Dunes National Park, July 2016

- 120 megapixel image; taken with a 17-megapixel camera
- Two rows of photos

Software for creating composite panoramas

For M=Mac, W=Win, L=Linux:

Commercial software:

- Adobe Photoshop (MW)

- Adobe Lightroom (MW)

- Adobe Photoshop Elements (MW) *I used this for 14 yrs*

- PhotoStitcher (MW $19.99)

Software for creating composite panoramas

Freeware:

- Autostitch (MW)
- Hugin (MWL)
- Microsoft ICE (W)

Creating a panorama using Photoshop

Step 1. Load the photos

- Make sure you know where to find your sequence of overlapping photos

- Start Photoshop

- Open the **File menu**

- In the menu, select **Automate**. A sub-menu appears.

- In the sub-menu, select **Photomerge.**
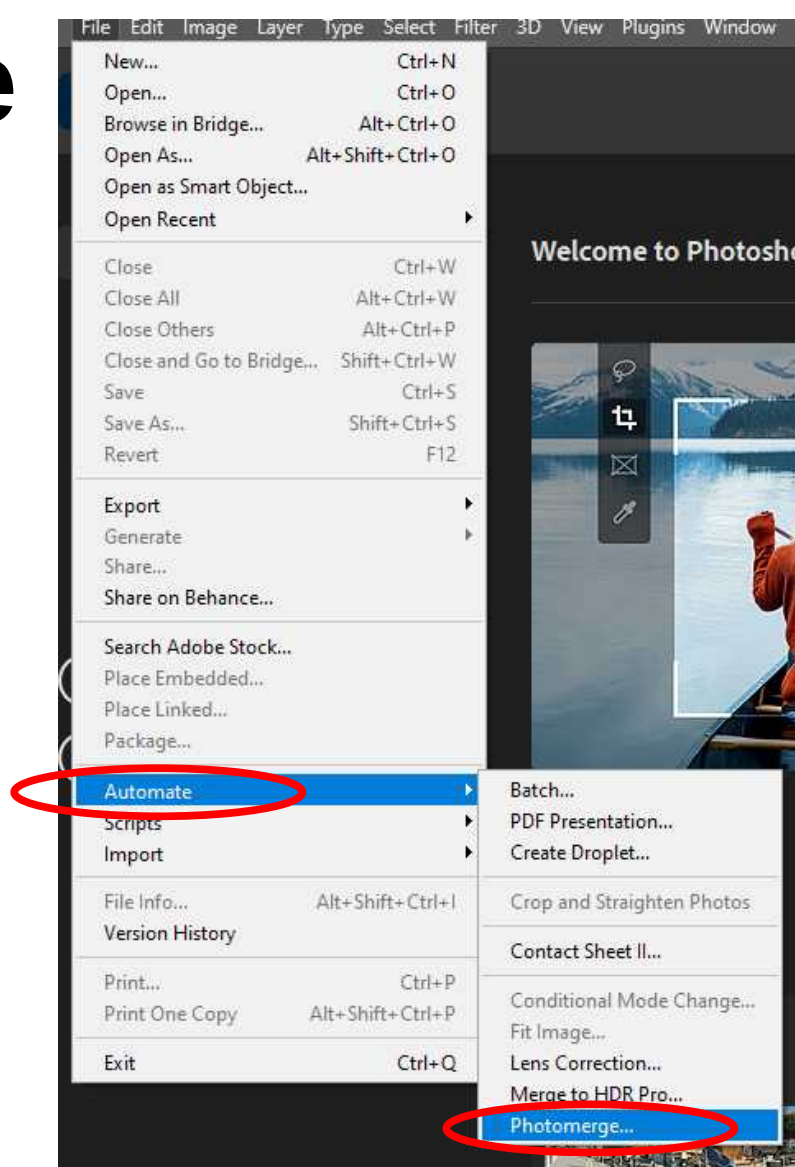
The Photomerge dialog window

- The Photomerge dialog window opens.

- Tap the **Browse button**.

- A standard open file dialog window opens. Navigate to your sequence of files, and select all of the files.

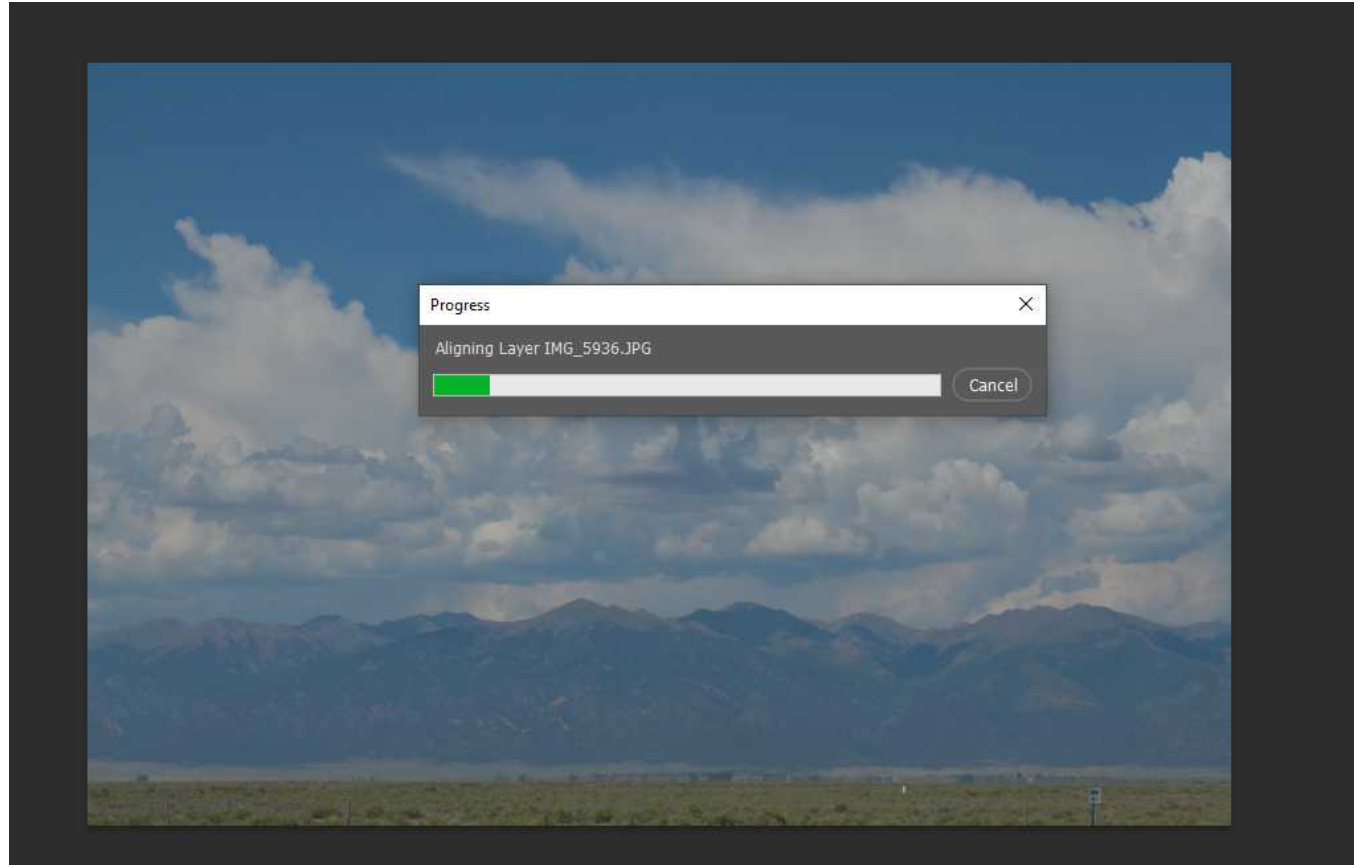- Click OK. The Open File dialog window closes.
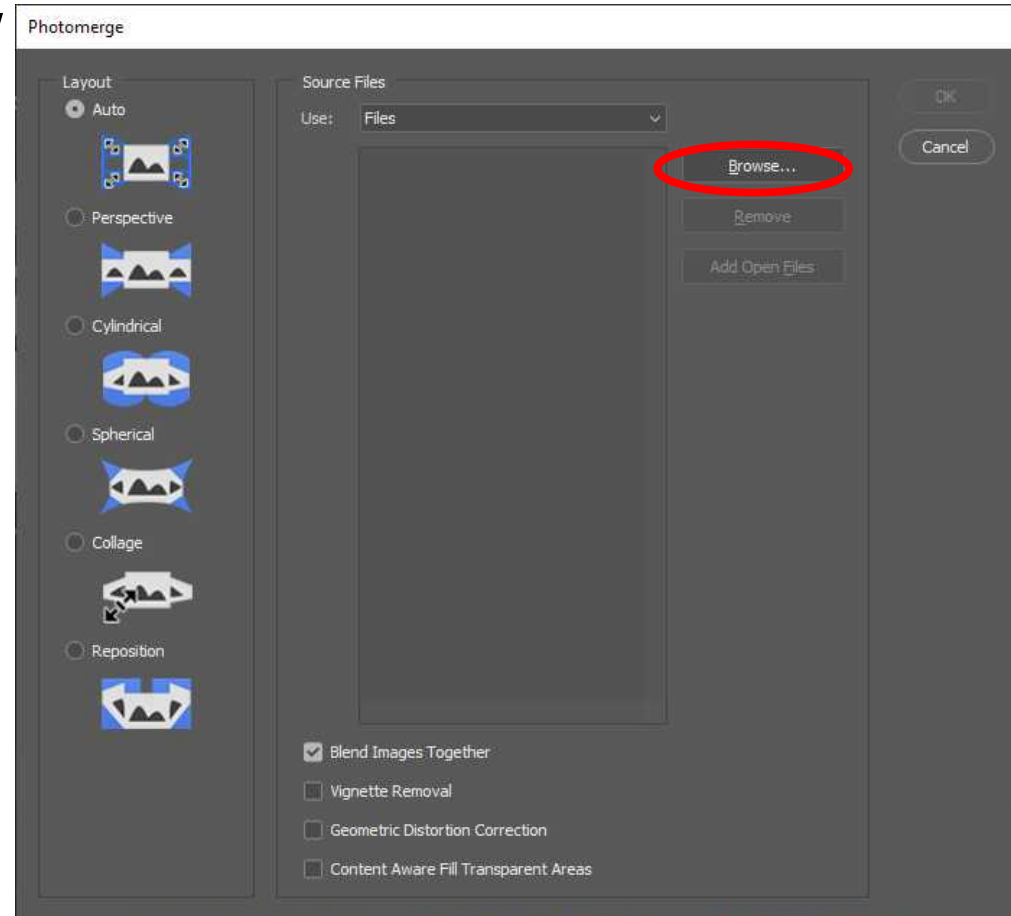
The Photomerge dialog window

- The file names appear in the Photomerge dialog window.

- Click the **OK button**.

- The Photomerge dialog window closes.
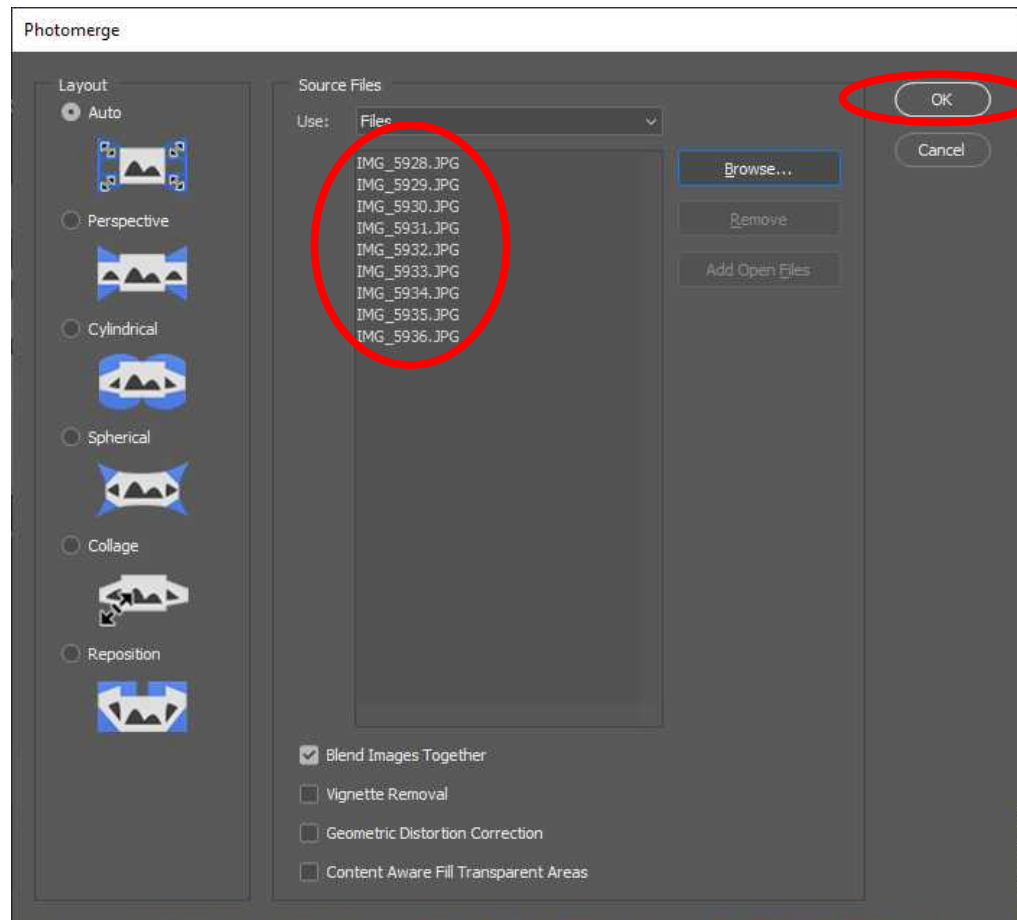
Step 2. Automated Assembly

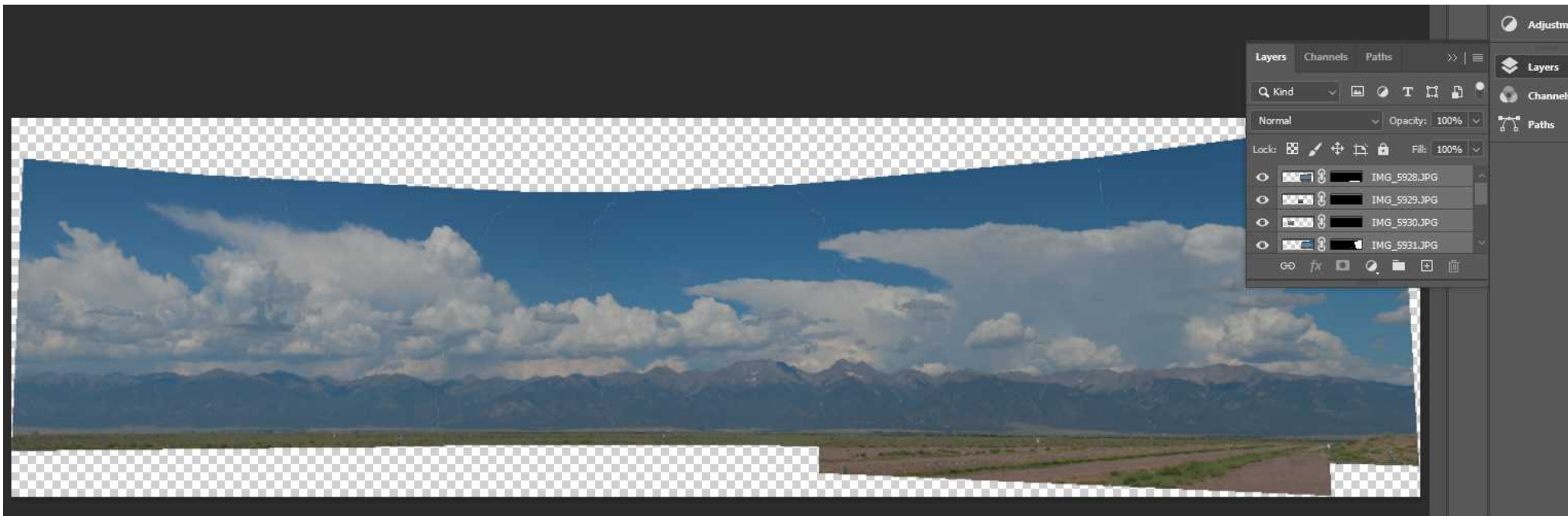- Photoshop displays a Progress bar.

- Take a break.
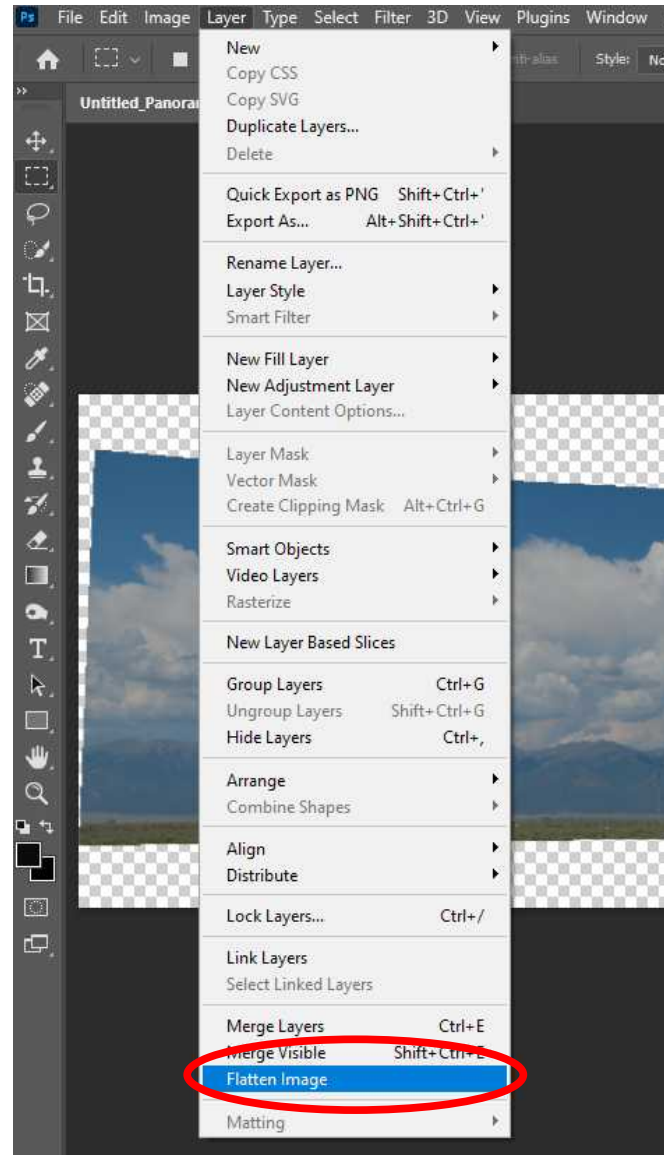
Initial Panoramic image

Taken through roughly 5 miles of air, so contrast is low.

There are layers here also

Step 3. Flatten the image

- In Photoshop, click the **Layer menu**.

- In the menu, select **Flatten Image**.

- Save the image as a file.

Post-processing Edits

- Crop unwanted blue sky and roads.

- Maximize contrast

- Reduce brightness of flat white highlights

Don't include much of the sky unless the sky is interesting

- Clouds above Mosquito Range in eastern San Luis Valley, north of Alamosa Colorado, July 2016

- 52 megapixels, photos taken with a 17-megapixel camera

- Shot on the same day I shot the Great Sand Dunes panorama

People panorama

- High school holiday concert, early 2006

- 11 megapixel image, photos taken with a 6-megapixel camera

THE END