Image Resize and Restore System Documentation

Connections
AWS S3 Bucket Name: deepak-image-scaling
AWS Lambda Function Name: image-resize-restore
AWS Region: us-east-1
Streamlit Application File: app.py

Introduction
This document describes the complete implementation of an Image Resize and Restore system using AWS services and a Streamlit based user interface. The goal of this project is to allow users to upload an original image, resize it automatically based on custom dimensions, and later restore the original image by uploading the resized image again.

Problem Statement
Users often need to resize images for applications while still preserving the original version. Additionally, they may need to retrieve the original image later. This project solves that problem using a serverless and automated architecture.

System Architecture Overview
The system consists of a Streamlit user interface, an AWS S3 bucket with structured folders, and an AWS Lambda function. The Streamlit UI handles user interactions. AWS S3 acts as the storage layer and event trigger. AWS Lambda performs image processing and restoration logic.

Folder Structure
The S3 bucket contains three main folders.
The original folder stores original uploaded images.
The resized folder stores resized images.
The restored folder stores restored original images.

Detailed Workflow
When a user uploads an original image through the UI, the file is uploaded to the original folder with width and height metadata. This upload triggers the Lambda function. The Lambda function reads the metadata, resizes the image using Pillow, and saves the resized image to the resized folder.

When a user uploads a resized image through the UI, the image is uploaded to the resized folder. This triggers the Lambda function again. The function detects that the upload came from the resized folder, finds the corresponding original image with the same filename in the original folder, and copies it into the restored folder.

Streamlit Application Description
The Streamlit application provides two tabs. One tab is used for resizing images and the

other for restoring images. The resize tab allows users to upload an image and specify custom width and height. The restore tab allows users to upload a resized image to restore its original version.

AWS Lambda Function Description
The Lambda function is triggered by S3 object creation events. It checks the folder prefix of the uploaded file. If the file is uploaded to the original folder, it performs resizing. If the file is uploaded to the resized folder, it performs restoration.

Image Processing Logic
The Lambda function uses the Pillow library to open and process images. The resizing operation uses a high quality resizing algorithm. The original image format is preserved.

Security and Permissions
The Lambda function requires permissions to read and write objects in the S3 bucket. The Streamlit application requires AWS credentials with access to upload files to S3.

Error Handling
The system includes error handling for missing files, unsupported formats, and permission issues. Logs are generated in CloudWatch for debugging.

Performance Considerations
Lambda memory should be set to at least 512 MB and timeout to at least 15 seconds. This ensures smooth image processing.

Testing Strategy
The system can be tested by uploading images via the Streamlit UI and verifying outputs in the S3 folders. Lambda test events can also be used for validation.

Deployment Steps
Create the S3 bucket and folders.
Deploy the Lambda function.
Configure S3 triggers.
Set up IAM roles.
Run the Streamlit application.

Limitations
The system relies on filename matching for restoration. If filenames differ, restoration will fail.

Future Enhancements
Support for image versioning.
Support for multiple resized versions.
Database based image mapping.

#APP.PY

```
import streamlit as st
import boto3
from botocore.exceptions import ClientError

AWS_REGION = "us-east-1"
BUCKET = "deepak-image-scaling"
s3 = boto3.client("s3", region_name=AWS_REGION)

st.set_page_config(page_title="Image Resize & Restore", layout="centered")
st.title(" Image Resize & Restore UI")

tab1, tab2 = st.tabs(["Resize Image (Upload Original)", "Restore Image (Upload Resized)"])

with tab1:
    st.header("Upload ORIGINAL Image → Resize Automatically")
    uploaded_file = st.file_uploader(
        "Choose an image to resize",
        type=["jpg", "jpeg", "png", "webp", "gif"],
        key="original"
    )

    col1, col2 = st.columns(2)
    with col1:
        width = st.number_input("Width (px)", min_value=50, value=300)
    with col2:
```

```
        height = st.number_input("Height (px)", min_value=50, value=300)

    if uploaded_file is not None:
        st.image(uploaded_file, caption="Preview Original", use_column_width=True)
        if st.button("Upload & Resize Original"):
            try:

                s3.put_object(
                    Bucket=BUCKET,
                    Key=f"original/{uploaded_file.name}",
                    Body=uploaded_file.read(),
                    ContentType=uploaded_file.type,
                    Metadata={"width": str(width), "height": str(height)}
                )
                st.success(f" Uploaded to original/{uploaded_file.name}\n"
                           f"Lambda will resize it automatically → resized/{uploaded_file.name}")
            except ClientError as e:
                st.error(f"AWS Error: {e}")

with tab2:
    st.header("Upload RESIZED Image → Restore Original Automatically")
    uploaded_file2 = st.file_uploader(
        "Choose a resized image",
        type=["jpg", "jpeg", "png", "webp", "gif"],
        key="resized"
    )
```

```
    if uploaded_file2 is not None:
        st.image(uploaded_file2, caption="Preview Resized", use_column_width=True)
        if st.button("Upload & Restore Original"):
            try:
                s3.put_object(
                    Bucket=BUCKET,
                    Key=f"resized/{uploaded_file2.name}",
                    Body=uploaded_file2.read(),
                    ContentType=uploaded_file2.type
                )
                st.success(f" Uploaded to resized/{uploaded_file2.name}\n"
                           f"Lambda will restore the original → restored/{uploaded_file2.name}")
            except ClientError as e:
                st.error(f"AWS Error: {e}")
```

```
#LAMBDA FUNCTION

import boto3
from PIL import Image, ImageFile
import io

ImageFile.LOAD_TRUNCATED_IMAGES = True

s3 = boto3.client("s3")
```

```
BUCKET = "deepak-image-scaling"
ORIGINAL_PREFIX = "original/"
RESIZED_PREFIX = "resized/"
RESTORED_PREFIX = "restored/"

DEFAULT_WIDTH = 300
DEFAULT_HEIGHT = 300

def lambda_handler(event, context):
  try:
    record = event["Records"][0]
    key = record["s3"]["object"]["key"]
    bucket = record["s3"]["bucket"]["name"]

    print(f"Triggered for key: {key}")

    if key.startswith(ORIGINAL_PREFIX):
      return resize_image(bucket, key)

    elif key.startswith(RESIZED_PREFIX):
      return restore_image(bucket, key)

    else:
      return {"message": "Ignored file"}

  except Exception as e:
```

```
        print("ERROR:", str(e))
        return {"error": str(e)}

# ---------- RESIZE ----------
def resize_image(bucket, key):
    filename = key.replace(ORIGINAL_PREFIX, "")

    obj = s3.get_object(Bucket=bucket, Key=key)
    body = obj["Body"].read()
    metadata = obj.get("Metadata", {})

    width = int(metadata.get("width", DEFAULT_WIDTH))
    height = int(metadata.get("height", DEFAULT_HEIGHT))

    img = Image.open(io.BytesIO(body))
    img.load()

    # Resize image
    resized = img.resize((width, height), Image.LANCZOS)

    buffer = io.BytesIO()
    fmt = img.format or "PNG"
    resized.save(buffer, fmt)
    buffer.seek(0)

    resized_key = f"{RESIZED_PREFIX}{filename}"
```

```
    # Upload resized image
    s3.put_object(
        Bucket=bucket,
        Key=resized_key,
        Body=buffer,
        ContentType=f"image/{fmt.lower()}"
    )

    print(f"Resized image saved to {resized_key}")

    return {"message": "Image resized", "resized_key": resized_key}

def restore_image(bucket, key):
    import os
    filename = os.path.basename(key)
    original_key = f"{ORIGINAL_PREFIX}{filename}"
    restored_key = f"{RESTORED_PREFIX}{filename}"

    try:

        original_obj = s3.get_object(Bucket=bucket, Key=original_key)
        original_body = original_obj["Body"].read()


        s3.put_object(
```

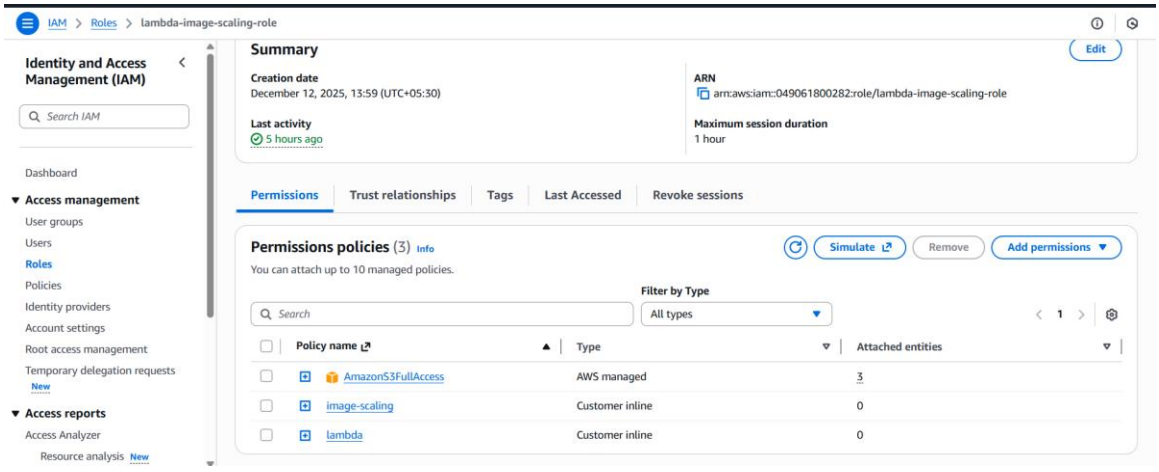
```
            Bucket=bucket,
            Key=restored_key,
            Body=original_body,
            ContentType=original_obj.get("ContentType", "image/png")
        )

        print(f"Original restored to {restored_key}")
        return {"message": "Original restored", "restored_key": restored_key}

    except s3.exceptions.NoSuchKey:
        print(f"Original image not found for {filename}")
        return {"error": f"Original image {filename} not found in original/ folder"}
    except Exception as e:
        print("Restore failed:", str(e))
        return {"error": str(e)}
```

#lambda—added policy in IAM

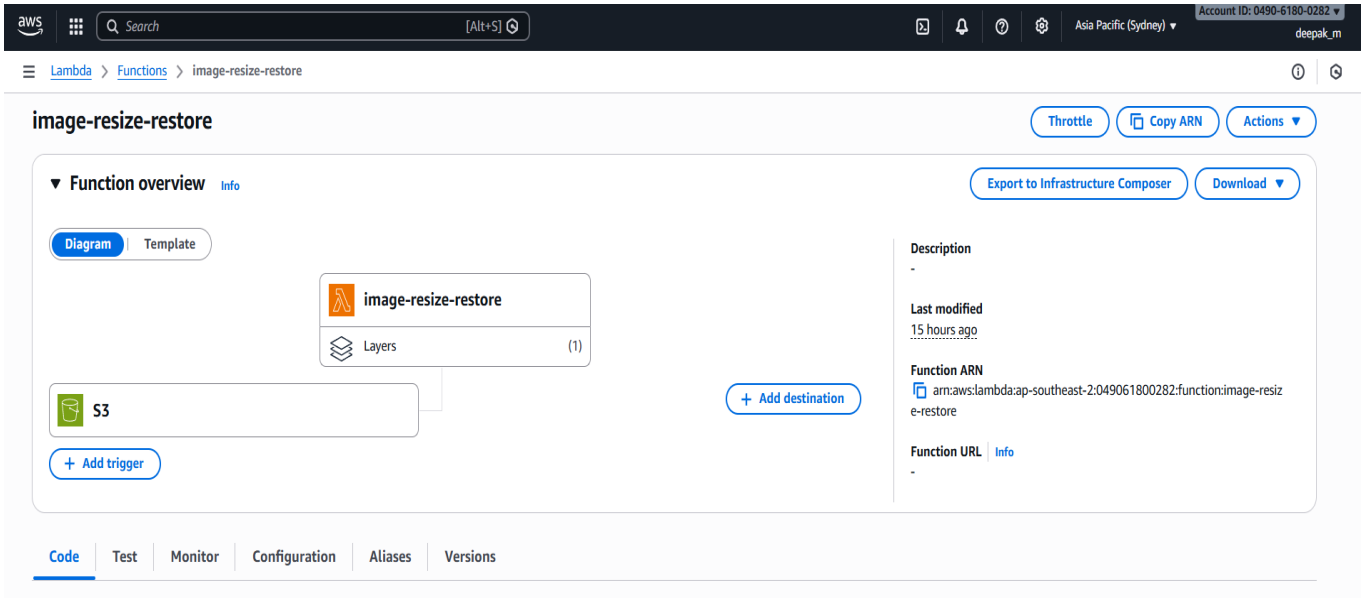
```
{
        "Version": "2012-10-17",
        "Statement": [
                {
                        "Effect": "Allow",
                        "Action": [
                                "s3:GetObject",
                                "s3:PutObject",
                                "s3:ListBucket"
```

```
                ],
                "Resource": [
                    "arn:aws:s3:::deepak-image-scaling",
                    "arn:aws:s3:::deepak-image-scaling/*"
                ]
            }
        ]
}
```

#IAM ROLE --IMG



#LAMBDA ---IMG



#S3 BUCKET---IMG