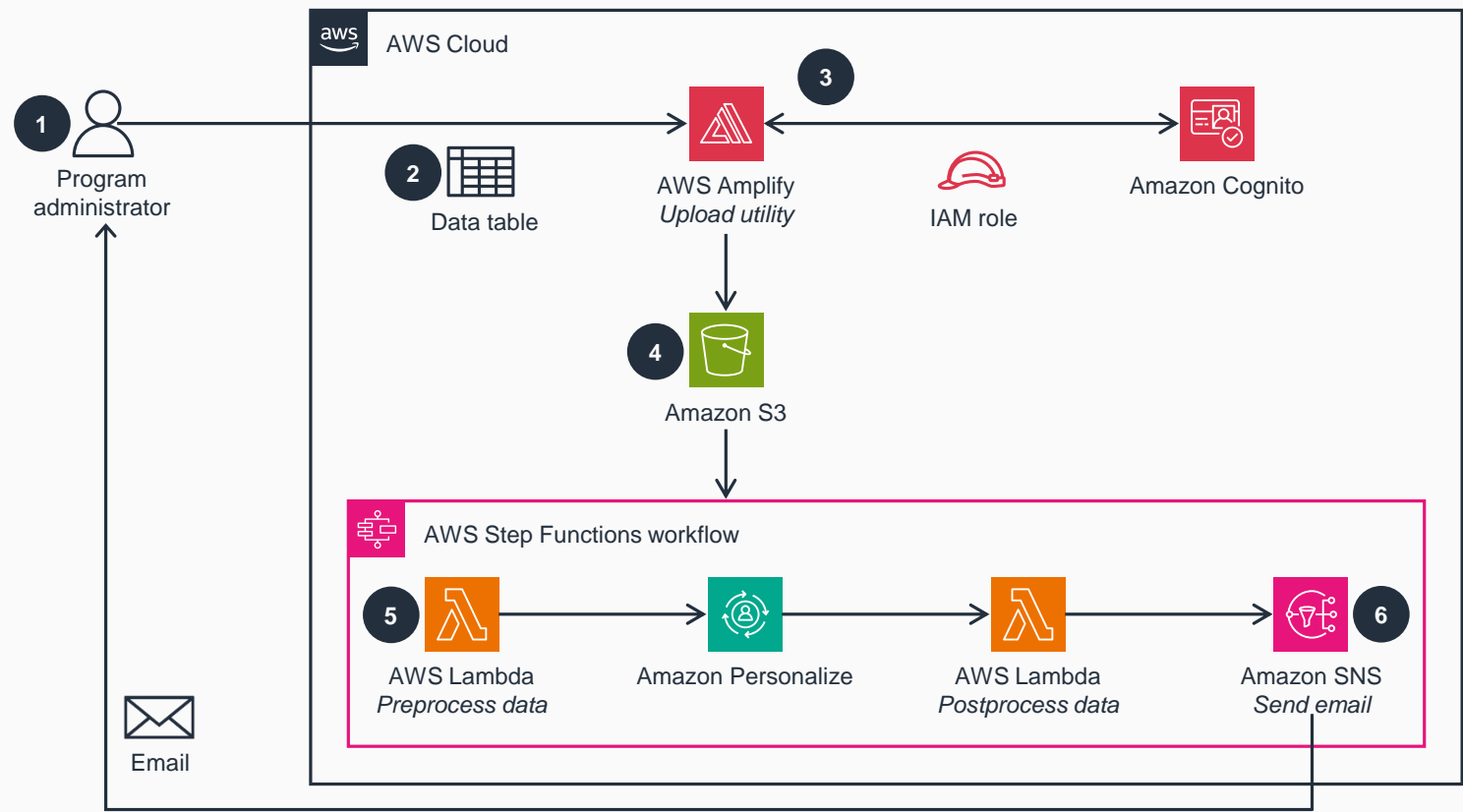# Guidance for Using Machine Learning to Customize Nonprofit Direct Mailings on AWS

This architecture diagram shows how nonprofits can use machine learning to personalize the messages sent in direct mailing efforts.

1. The program administrator collects member data into a data table from multiple data sources across the enterprise, including customer relationship management and payment systems. Member interaction data from prior programs and online content provides the data needed to build an ML model.

2. The program administrator uploads the table of collected data to an upload utility hosted in **AWS Amplify**.

3. The upload utility authenticates the program administrator's credentials using **Amazon Cognito**, which returns an **AWS Identity and Access Management (IAM)** role to access AWS resources.

4. The upload utility saves the data table to an **Amazon Simple Storage Service (Amazon S3)** bucket.

5. Adding the data table to the **S3** bucket generates an event, which is used to automatically start an **AWS Step Functions** workflow. The **Step Functions** workflow extracts data from the table and uses it to build an ML model with **Amazon Personalize**. Generated predictions are added back into the table.

6. The updated data table is saved to **Amazon S3**. **Amazon Simple Notification Service (Amazon SNS)** sends an email to the program administrator to alert them that the new file is available. The email includes a presigned URL, which lets the program administrator easily download the new table. The new table can be used in a mail merge or sent to a third party to generate customized direct mail pieces.

AWS Reference Architecture