AWS Assignment 3 - Brief

Below is an assignment that integrates Step Functions, CloudWatch, SES, EventBridge Scheduler, EventBridge, SNS, and SQS into a cohesive serverless order processing pipeline. This scenario will give hands-on experience with orchestrating workflows, event-driven architectures, and monitoring/logging across multiple AWS services.

Assignment: AWS Serverless Mini-Pipeline

Objective

Build a simple serverless workflow that:

- Receives an order message via SQS.
- Processes the message through a Step Functions workflow invoking a single Lambda function.
- Uses that Lambda function to log the event in CloudWatch, send a confirmation email via SES, and publish a notification via SNS.
- Uses an EventBridge Scheduler (or EventBridge rule) to trigger a heartbeat Lambda that logs a periodic message.

Assignment Tasks

1. SQS – Simple Message Queue

- **Create an SQS Queue:**
  - **Name:** `SimpleOrderQueue`
  - Use default settings to keep it simple.
- **Send a Test Message:**

Use the AWS Console or CLI to send a sample JSON message (e.g.,
{ "orderId": "001", "customerEmail": "raju@gmail.com" }
```).
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2. Lambda Function – Process Order Message

- **Create a Lambda Function:**
  - **Name:** `ProcessOrderFunction`
  - **Runtime:** (e.g., Python, Node.js)
- **Function Tasks:**
  - **Log Event:** Write the incoming event details to CloudWatch.
  - **Send Email via SES:**
    - Use the SES API to send a simple confirmation email to the `customerEmail` received.
    - (Ensure that the sender email is verified in SES.)
  - **Publish SNS Notification:**
    - Publish a message to an SNS topic (created in Task 4) confirming order processing.
- **IAM Permissions:**
  - Ensure the Lambda execution role includes permissions for CloudWatch logs, SES, and SNS.

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3. Step Functions – Minimal Workflow

- **Create a State Machine:**
  - **Name:** `SimpleOrderWorkflow`
  - **Definition:**
    - A single state that invokes the `ProcessOrderFunction` Lambda.
    - Pass the SQS message payload directly as input.
- **Triggering the Workflow:**
  - **Option A:** Manually start an execution with the test message.
  - **Option B:** (For extra practice) Configure an EventBridge rule to trigger the state machine on a schedule.

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4. SNS – Notification Setup

- **Create an SNS Topic:**
  - **Name:** `SimpleOrderNotifications`
- **Subscribe to the Topic:**
  - Add an email subscription (verify the email if necessary).
- **Integration:**
  - The `ProcessOrderFunction` will publish a notification to this topic once the order is processed.

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5. SES – Email Confirmation

- **Configure SES:**
  - **Verify Email:** Ensure your sender email is verified in SES (and the recipient if needed, due to sandbox restrictions).
- **Integration:**
  - Within `ProcessOrderFunction`, use SES to send an order confirmation email containing basic order details.

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6. EventBridge Scheduler – Heartbeat Test

- **Create an EventBridge Rule or Scheduler:**
  - **Name:** `HeartbeatRule`
  - **Schedule:** Set a rule to trigger every 5–10 minutes (or a one-time test schedule).
- **Create a Heartbeat Lambda Function:**
  - **Name:** `HeartbeatFunction`
  - **Task:** Log a simple "Heartbeat – Scheduler Triggered" message to CloudWatch.
- **Integration:**
  - Configure the EventBridge rule to trigger `HeartbeatFunction` on schedule.

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7. CloudWatch – Monitoring & Logging

- **Enable Logging:**
  - Ensure all Lambda functions and the Step Functions state machine output logs to CloudWatch.
- **Verification:**
  - Check CloudWatch logs to confirm that:
    - `ProcessOrderFunction` logs the received SQS message.
    - SES and SNS operations are logged.
    - `HeartbeatFunction` logs a scheduled heartbeat message.

Submission Requirements

1. **Documentation:**
   - A brief write-up explaining the purpose of each service and how they interact.
   - A simple diagram showing the flow:
     - SQS → Step Functions → Lambda → (SES & SNS)
     - EventBridge triggering the Heartbeat Lambda.
2. **Screenshots:**

    - SQS Queue configuration with a sample message.
    - Step Functions state machine definition and a sample execution.
    - Lambda function code (or snippet) with CloudWatch log outputs.
    - SNS topic configuration and a screenshot of the received email notification.
    - EventBridge rule/scheduler configuration and the Heartbeat Lambda's CloudWatch logs.
3. **Source Code:**
    - Provide code snippets for your Lambda functions.
4. **Deployment Instructions:**
    - A brief guide on how to deploy and test your solution.

Evaluation Criteria

- **Service Integration:** Correct creation and integration of SQS, Step Functions, Lambda, SNS, SES, EventBridge, and CloudWatch.
- **Functionality:** The pipeline should process a test message end-to-end, log events, send a confirmation email, and publish an SNS notification.
- **Simplicity:** Implementation should be achievable within approximately 2 hours.
- **Documentation:** Clear and concise documentation with diagrams and screenshots.

This assignment allows you to gain hands-on experience with key AWS serverless and event-driven services, Happy building!