AWS Infrastructure Components and Diagram

AWS Infrastructure Components:

- **VPC (Virtual Private Cloud):** Provides an isolated network within AWS.
- **Subnets:** Divides the VPC into smaller sections for better traffic management.
    - **Public Subnet:** Contains resources accessible from the internet.
    - **Private Subnet:** Contains resources not directly accessible from the internet.
- **Internet Gateway (IGW):** Allows communication between the VPC and the internet.
- **NAT Gateway:** Allows instances in the private subnet to access the internet while remaining unreachable from the internet.
- **EC2 Instances:** Virtual servers running applications or services.
- **S3 (Simple Storage Service):** Object storage service.
- **IAM (Identity and Access Management):** Manages user access and permissions.
- **CloudTrail:** Logs API calls for your account.
- **Security Groups:** Acts as a virtual firewall to control inbound and outbound traffic for instances.

Written Explanation and Justification of Cloud Architecture Design

Architecture Design:

1. **VPC Configuration:**
    - Created a VPC to provide an isolated network environment.
    - Divided the VPC into public and private subnets for better traffic management and security.
2. **Subnets:**
    - **Public Subnet:** Used for resources that need to be accessed from the internet, such as web servers.
    - **Private Subnet:** Used for resources that do not need direct internet access, such as databases.
3. **Internet and NAT Gateways:**
    - **Internet Gateway:** Provides internet access to the public subnet.
    - **NAT Gateway:** Allows instances in the private subnet to access the internet without exposing them to inbound internet traffic.
4. **EC2 Instances:**
    - **Public Subnet EC2:** Hosts web servers or other public-facing services.
    - **Private Subnet EC2:** Hosts application servers, internal services, and databases.
5. **S3:**
    - Used for storing objects such as backups, logs, and static files.
6. **IAM:**
    - Manages access to AWS services and resources securely with user policies and roles.

7. **CloudTrail:**
    - Provides logging of API calls to monitor and track user activity.

Incorporation into Technical Demo

AWS IAM:

- Implemented to manage user access and permissions securely. Used IAM roles for EC2 instances to provide necessary permissions without embedding credentials.

AWS CloudTrail:

- Enabled CloudTrail to log all API calls, which helps in auditing and compliance. Demonstrated how to use CloudTrail logs to investigate any suspicious activity.