IaC Confluent Cloud AWS Private Linking with Cluster Linking Example

```
flowchart TB
    subgraph CONFLUENT["Confluent Cloud"]
        subgraph ENV["Environment: non-prod"]
            subgraph PLATT["Private Link Attachment"]
                PLService["PrivateLink Service"]
                DNSDomain["DNS Domain"]
            end

            subgraph SANDBOX_CLUSTER["Sandbox Cluster - Enterprise"]
                SandboxKafka["Kafka Brokers"]
                SandboxTopic["dev-stock_trades Topic"]
                DatagenConnector["Datagen Connector"]
            end

            subgraph SHARED_CLUSTER["Shared Cluster - Enterprise"]
                SharedKafka["Kafka Brokers"]
                MirrorTopic["dev-stock_trades Mirror"]
            end

            subgraph CLUSTER_LINK["Bidirectional Cluster Link"]
                LinkSandboxShared["sandbox to shared"]
            end

            subgraph STREAM_GOV["Stream Governance"]
                SchemaRegistry["Schema Registry"]
            end
        end
    end

    DatagenConnector --> SandboxTopic
    SandboxTopic --> LinkSandboxShared
    LinkSandboxShared --> MirrorTopic

    subgraph AWS["AWS Cloud"]
        subgraph TGW["Transit Gateway"]
            TGWCore["TGW Core"]
            TGWRT["Route Table"]
        end

        subgraph DNS_VPC["DNS VPC - Centralized"]
            R53Inbound["Route53 Inbound Resolver"]
        end

        subgraph VPN_VPC["Client VPN VPC"]
            VPNEndpoint["Client VPN Endpoint"]
            VPNClients["VPN Clients"]
```

```
        end

        subgraph TFC_AGENT_VPC["TFC Agent VPC"]
            TFCAgents["Terraform Cloud Agents"]
        end

        subgraph SANDBOX_VPC["Sandbox PrivateLink VPC - 10.0.0.0/20"]
            SandboxSub1["Subnet AZ-1"]
            SandboxSub2["Subnet AZ-2"]
            SandboxSub3["Subnet AZ-3"]
            SandboxVPCE["VPC Endpoint"]
            SandboxSG["Security Group"]
        end

        subgraph SHARED_VPC["Shared PrivateLink VPC - 10.1.0.0/20"]
            SharedSub1["Subnet AZ-1"]
            SharedSub2["Subnet AZ-2"]
            SharedSub3["Subnet AZ-3"]
            SharedVPCE["VPC Endpoint"]
            SharedSG["Security Group"]
        end

        subgraph ROUTE53["Route53 DNS Configuration"]
            PHZ["Private Hosted Zone"]
            ZonalRecords["Zonal CNAME Records"]
            WildcardRecord["Wildcard CNAME"]
            SystemRule["SYSTEM Resolver Rule"]
        end

        SecretsManager["AWS Secrets Manager"]
    end

    SandboxVPCE --> SandboxSG
    SharedVPCE --> SharedSG
    PHZ --> ZonalRecords
    PHZ --> WildcardRecord

    SandboxVPCE -->|PrivateLink| PLService
    SharedVPCE -->|PrivateLink| PLService
    PLService --> SandboxKafka
    PLService --> SharedKafka

    SANDBOX_VPC -->|TGW Attachment| TGW
    SHARED_VPC -->|TGW Attachment| TGW
    DNS_VPC -->|TGW Attachment| TGW
    VPN_VPC -->|TGW Attachment| TGW
    TFC_AGENT_VPC -->|TGW Attachment| TGW

    TFCAgents -->|DNS Query| R53Inbound
    VPNClients -->|DNS Query| R53Inbound
    R53Inbound --> PHZ
    PHZ -->|Returns Endpoint IPs| SandboxVPCE
    PHZ -->|Returns Endpoint IPs| SharedVPCE
```

```
    PHZ -.->|Zone Association| TFC_AGENT_VPC
    PHZ -.->|Zone Association| DNS_VPC
    PHZ -.->|Zone Association| VPN_VPC
    PHZ -.->|Zone Association| SANDBOX_VPC
    PHZ -.->|Zone Association| SHARED_VPC

    SystemRule -.->|Rule Association| TFC_AGENT_VPC
    SystemRule -.->|Rule Association| DNS_VPC
    SystemRule -.->|Rule Association| VPN_VPC
    SystemRule -.->|Rule Association| SANDBOX_VPC
    SystemRule -.->|Rule Association| SHARED_VPC

    TFCAgents -->|Kafka 9092 via TGW| SandboxVPCE
    TFCAgents -->|Kafka 9092 via TGW| SharedVPCE
    VPNClients -->|Kafka 9092 via TGW| SandboxVPCE

    TFCAgents -.->|API Keys| SecretsManager

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```

```
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    style PHZ fill:#1b998b,stroke:#ffffff,stroke-width:2px,color:#ffffff
    style SecretsManager fill:#dd6b20,stroke:#ffffff,stroke-
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```
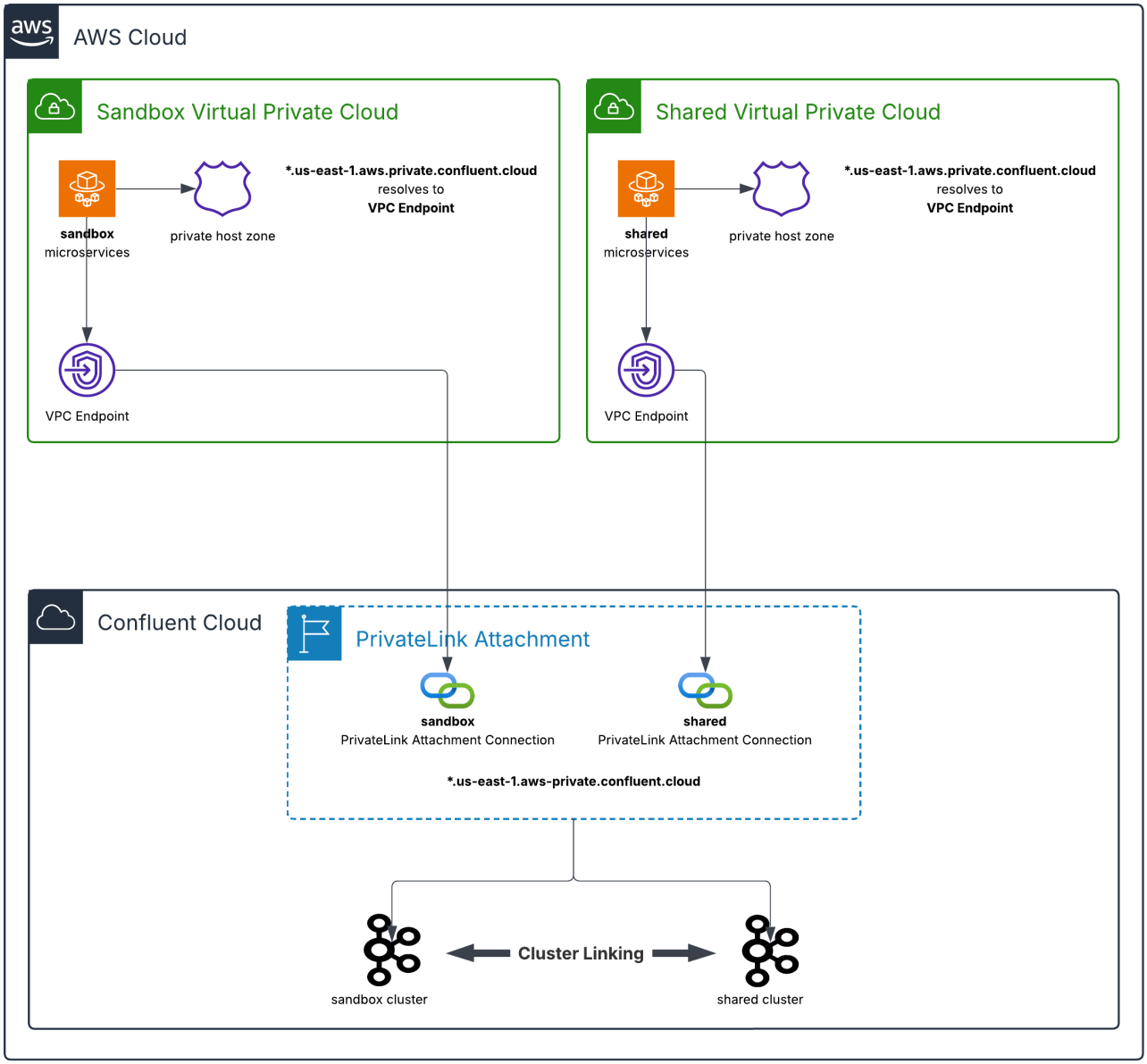

This repository provides **production-grade Terraform infrastructure-as-code** that implements a **secure, multi-network Confluent Cloud architecture**. It demonstrates **AWS PrivateLink connectivity from a single Confluent Cloud environment to multiple AWS VPCs**, enabling private, network-isolated access without exposing traffic to the public internet.

The solution also showcases **in-region Cluster Linking between two Confluent Cloud Kafka clusters**, enabling **low-latency, fully managed data replication** across teams, lines of business, or isolated environments (for example, development, staging, and production) within the same AWS region.

Cluster Linking maintains an **in-sync mirror of selected topics** on the consuming cluster. This isolation allows consuming teams to independently scale **large numbers of consumers, stream processing applications, and downstream sinks** without impacting the producing cluster. From the producer's perspective, the load is equivalent to **a single additional consumer**, regardless of downstream scale.



Access control and ownership remain cleanly separated: the producing team grants **scoped read credentials** to approved topics, while the consuming team **creates, owns, monitors, and manages the cluster link**. This pattern enables secure, scalable data sharing with clear operational boundaries and minimal coupling.

Below is the Terraform resource visualization of the infrastructure that's created:

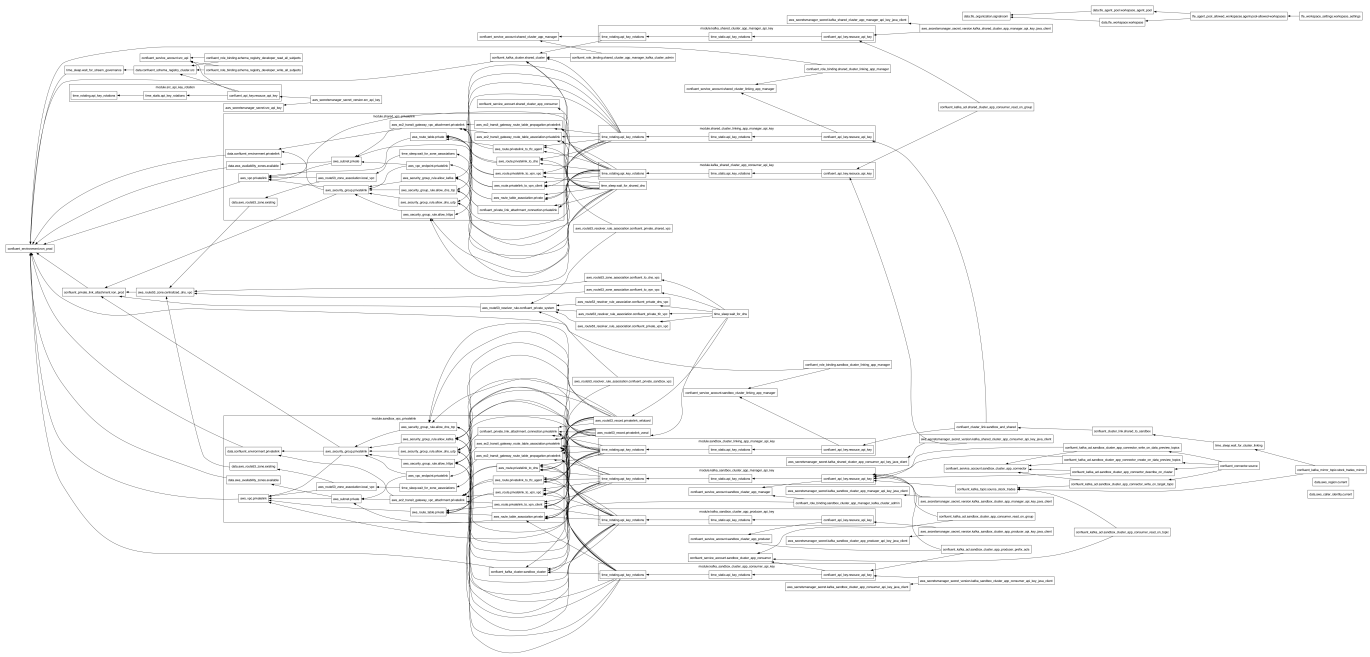


Table of Contents

1.0 Prerequisites

This project assumes you have the following prerequisites in place:

- Client VPN, Centralized DNS Server, and Transit Gateway
- Terraform Cloud Agent

1.1 Client VPN, Centralized DNS Server, and Transit Gateway

```
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'primaryTextColor': '#fff', 'primaryBorderColor': '#1557b0', 'lineColor':
'#5f6368', 'secondaryColor': '#34a853', 'tertiaryColor': '#fbbc04'}}}%%

flowchart TB
    subgraph USERS["👤 Remote Users"]
        VPNClient["VPN Client
(OpenVPN/AWS Client)"]
    end

    subgraph AWS["☁ AWS Cloud"]
        subgraph VPN_VPC["Client VPN VPC
var.vpn_vpc_cidr"]
            VPNEndpoint["AWS Client VPN
Endpoint"]
            VPNSubnets["VPN Subnets
(Multi-AZ)"]
            VPNSG["Security Group
client-vpn-sg"]
            VPNResolver["Route53 Outbound
Resolver Endpoint"]
            VPNEndpoint --> VPNSubnets
            VPNSubnets --> VPNSG
            VPNSubnets --> VPNResolver
        end

        subgraph TGW["Transit Gateway
signalroom-tgw"]
            TGWCore["TGW Core
ASN: 64512"]
            TGWRouteTable["Custom Route
```

```
Tables"]
            TGWCore --> TGWRouteTable
        end

        subgraph DNS_VPC["DNS VPC (Centralized)
var.dns_vpc_cidr"]
            R53Inbound["Route53 Inbound
Resolver Endpoint"]
            R53PHZ["Private Hosted Zones
*.aws.confluent.cloud"]
            R53Inbound --> R53PHZ
        end

        subgraph TFC_VPC["TFC Agent VPC
var.tfc_agent_vpc_cidr"]
            TFCAgent["Terraform Cloud
Agent"]
        end

        subgraph WORKLOAD_VPCs["Workload VPCs"]
            subgraph WL1["Workload VPC 1"]
                VPCE1["VPC Endpoint
(PrivateLink)"]
            end
            subgraph WL2["Workload VPC N..."]
                VPCEN["VPC Endpoint
(PrivateLink)"]
            end
        end

        ACM["ACM Certificates
(Server & Client)"]
        CWLogs["CloudWatch Logs
VPN & Flow Logs"]
    end

    subgraph CONFLUENT["☁ Confluent Cloud"]
        PrivateLinkService["PrivateLink Service
Endpoint"]
        Kafka["Kafka Cluster
(Private)"]
        PrivateLinkService --> Kafka
    end

    %% Connections
    VPNClient -->|"Mutual TLS
Authentication"| VPNEndpoint
    ACM -.->|"Certificate Auth"| VPNEndpoint

    VPN_VPC -->|"TGW Attachment"| TGW
    DNS_VPC -->|"TGW Attachment"| TGW
    TFC_VPC -->|"TGW Attachment"| TGW
    WL1 -->|"TGW Attachment"| TGW
    WL2 -->|"TGW Attachment"| TGW
```

```
    VPNResolver -->|"DNS Forwarding
Rule"| R53Inbound
    R53PHZ -->|"Returns Private
Endpoint IPs"| VPCE1

    VPCE1 -->|"AWS PrivateLink"| PrivateLinkService
    VPCEN -->|"AWS PrivateLink"| PrivateLinkService

    VPNEndpoint -.->|"Logs"| CWLogs
    TGW -.->|"Flow Logs"| CWLogs

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    classDef vpcStyle fill:#e8f0fe,stroke:#1a73e8,stroke-width:2px
    classDef tgwStyle fill:#fef7e0,stroke:#f9ab00,stroke-width:3px
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    classDef confluentStyle fill:#f3e8fd,stroke:#9334e6,stroke-width:2px
    classDef serviceStyle fill:#fff,stroke:#5f6368,stroke-width:1px

    class USERS userStyle
    class VPN_VPC,TFC_VPC,WORKLOAD_VPCs,WL1,WL2 vpcStyle
    class TGW tgwStyle
    class DNS_VPC dnsStyle
    class CONFLUENT confluentStyle
```

1.1.1 Key Features Required for Confluent PrivateLink to Work

1.1.1.1 Hub-and-Spoke Network Architecture via Transit Gateway

- Transit Gateway serves as the central routing hub connecting all VPCs
- Disabled default route table association/propagation for explicit routing control
- DNS support enabled on the TGW (`dns_support = "enable"`)
- Custom route tables for fine-grained traffic control between VPCs

1.1.1.2 Centralized DNS Resolution (Critical for PrivateLink)

- **Dedicated DNS VPC** with Route53 Inbound Resolver endpoints
- **Private Hosted Zones** for `*.aws.confluent.cloud` domain
- DNS forwarding rules route Confluent queries from all VPCs to the central DNS VPC
- Route53 Outbound Resolver in VPN VPC forwards to DNS VPC resolver IPs

1.1.1.3 DNS Forwarding Chain (as documented in your outputs)

1. Client queries `lkc-xxxxx.us-east-1.aws.private.confluent.cloud`
2. VPN VPC's default DNS forwards to Route53 Outbound Resolver
3. Outbound Resolver forwards to DNS VPC Inbound Resolver
4. DNS VPC checks Private Hosted Zones → returns VPC Endpoint private IPs

1.1.1.4 VPC Endpoints (AWS PrivateLink)

- VPC Endpoints in workload VPCs connecting to Confluent's PrivateLink service
- Security groups allowing traffic from authorized sources (VPN clients, TFC agents)

1.1.1.5 Client VPN Integration

- Mutual TLS authentication using ACM certificates (server + client)
- Split tunnel configuration for routing only Confluent traffic through VPN
- Authorization rules controlling which CIDRs VPN clients can access
- Routes added to VPN endpoint for all workload VPC CIDRs via Transit Gateway

1.1.1.6 Cross-VPC Routing

- TGW attachments for: VPN VPC, DNS VPC, TFC Agent VPC, and all Workload VPCs
- Route tables in each VPC with routes to other VPCs via TGW
- Workload VPC CIDRs aggregated and distributed to VPN client routes

1.1.1.7 Security & Observability

- Dedicated security groups per component (VPN endpoint, etc.)
- VPC Flow Logs and TGW Flow Logs to CloudWatch
- VPN connection logging for audit trails
- IAM roles with least-privilege for flow log delivery

1.2 Terraform Cloud Agent

```
%%{init: {'theme': 'base', 'themeVariables': { 'primaryColor': '#1a73e8',
'primaryTextColor': '#fff', 'primaryBorderColor': '#1557b0', 'lineColor':
'#5f6368', 'secondaryColor': '#34a853', 'tertiaryColor': '#fbbc04'}}}%%

flowchart TB
    subgraph TERRAFORM_CLOUD["☁ Terraform Cloud (HCP)"]
        TFC["Terraform Cloud
API & Workspaces"]
        AgentPool["Agent Pool
(signalroom)"]
    end

    subgraph AWS["☁ AWS Cloud"]
        subgraph TFC_AGENT_VPC["TFC Agent VPC
var.vpc_cidr"]
            subgraph PUBLIC_SUBNETS["Public Subnets (Multi-AZ)"]
                IGW["Internet
Gateway"]
                NAT1["NAT Gateway
AZ-1"]
                NAT2["NAT Gateway
AZ-2"]
            end
```

```
            subgraph PRIVATE_SUBNETS["Private Subnets (Multi-AZ)"]
                subgraph ECS["ECS Fargate Cluster"]
                    TFCAgent1["TFC Agent
Container"]
                    TFCAgent2["TFC Agent
Container"]
                end

                subgraph AWS_ENDPOINTS["AWS VPC Endpoints"]
                    VPCE_SM["Secrets Manager
Endpoint"]
                    VPCE_CW["CloudWatch Logs
Endpoint"]
                    VPCE_ECR["ECR API/DKR
Endpoints"]
                    VPCE_S3["S3 Gateway
Endpoint"]
                end

                CONFLUENT_SG["Confluent PrivateLink
Security Group"]
            end

            DHCP["DHCP Options
(Custom DNS)"]
            TFC_AGENT_SG["TFC Agent
Security Group"]
        end

        subgraph TGW["Transit Gateway
signalroom-tgw"]
            TGWCore["TGW Core"]
            TGWRT["Route Table"]
        end

        subgraph DNS_VPC["DNS VPC (Centralized)
var.dns_vpc_cidr"]
            R53Inbound["Route53 Inbound
Resolver"]
            PHZ["Private Hosted Zones
*.aws.confluent.cloud"]
        end

        subgraph CLIENT_VPN_VPC["Client VPN VPC
var.client_vpn_vpc_cidr"]
            VPNEndpoint["Client VPN
Endpoint"]
        end

        subgraph WORKLOAD_VPCs["Workload VPCs
(Confluent PrivateLink)"]
            subgraph WL1["Workload VPC 1"]
                VPCE1["PrivateLink
```

```
Endpoint"]
            end
            subgraph WL2["Workload VPC N"]
                VPCEN["PrivateLink
Endpoint"]
            end
        end

        SecretsManager["AWS Secrets Manager
(TFC Agent Token)"]
        CloudWatch["CloudWatch Logs"]
        ECR_Registry["ECR Registry
(hashicorp/tfc-agent)"]
    end

    subgraph CONFLUENT["☁ Confluent Cloud"]
        PrivateLinkSvc["PrivateLink
Service"]
        Kafka["Kafka Cluster
(Private)"]
    end

    %% External Connections
    TFC <-->|"HTTPS/443
via NAT"| TFCAgent1
    TFC <-->|"HTTPS/443
via NAT"| TFCAgent2
    AgentPool -.->|"Agent Registration"| TFCAgent1

    %% Internal VPC Connections
    TFCAgent1 --> TFC_AGENT_SG
    TFCAgent2 --> TFC_AGENT_SG
    TFCAgent1 --> VPCE_SM
    TFCAgent2 --> VPCE_CW

    VPCE_SM -.->|"Private DNS"| SecretsManager
    VPCE_CW -.->|"Private DNS"| CloudWatch
    VPCE_ECR -.->|"Private DNS"| ECR_Registry

    NAT1 --> IGW
    NAT2 --> IGW
    TFCAgent1 -->|"0.0.0.0/0"| NAT1
    TFCAgent2 -->|"0.0.0.0/0"| NAT2

    %% DHCP & DNS Flow
    DHCP -->|"DNS Servers:
VPC + Centralized"| TFCAgent1
    TFCAgent1 -->|"DNS Query:
*.confluent.cloud"| R53Inbound

    %% Transit Gateway Connections
    TFC_AGENT_VPC -->|"TGW Attachment"| TGW
    DNS_VPC -->|"TGW Attachment"| TGW
    CLIENT_VPN_VPC -->|"TGW Attachment"| TGW
```

```
    WL1 -->|"TGW Attachment"| TGW
    WL2 -->|"TGW Attachment"| TGW

    %% Route Propagation
    TGWCore --> TGWRT

    %% DNS Resolution
    R53Inbound --> PHZ
    PHZ -->|"Returns Private IPs"| VPCE1

    %% PrivateLink Connections
    VPCE1 -->|"AWS PrivateLink"| PrivateLinkSvc
    VPCEN -->|"AWS PrivateLink"| PrivateLinkSvc
    PrivateLinkSvc --> Kafka

    %% TFC Agent to Workload VPCs
    TFC_AGENT_SG -->|"HTTPS/443
Kafka/9092"| CONFLUENT_SG
    CONFLUENT_SG -->|"via TGW"| VPCE1
    CONFLUENT_SG -->|"via TGW"| VPCEN

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    classDef endpointStyle fill:#fce8e6,stroke:#ea4335,stroke-width:1px
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    class TERRAFORM_CLOUD tfcStyle
    class TFC_AGENT_VPC,CLIENT_VPN_VPC,WORKLOAD_VPCs,WL1,WL2 vpcStyle
    class TGW tgwStyle
    class DNS_VPC dnsStyle
    class CONFLUENT confluentStyle
    class AWS_ENDPOINTS,VPCE_SM,VPCE_CW,VPCE_ECR,VPCE_S3 endpointStyle
    class ECS ecsStyle
```

1.2.1 Key Features Required for Confluent PrivateLink to Work (TFC Agent Configuration)

1.2.1.1 Custom DHCP Options for DNS Resolution

- DHCP Options Set configured with **dual DNS servers**: VPC default DNS (`cidrhost(vpc_cidr, 2)`) AND centralized DNS VPC resolver IPs
- Region-aware domain name configuration (`ec2.internal` for us-east-1, `{region}.compute.internal` for others)
- Associates TFC Agent VPC with custom DHCP options to route Confluent domain queries to the central DNS infrastructure

1.2.1.2 Transit Gateway Connectivity

- TFC Agent VPC attached to shared Transit Gateway with DNS support enabled
- Explicit route table association and route propagation (not using TGW defaults)
- Routes added from private subnets to: DNS VPC, Client VPN VPC, and all Workload VPCs containing PrivateLink endpoints
- Flattened route map pattern (`for_each`) ensures routes are created for every workload VPC CIDR

1.2.1.3 Security Group Configuration for Kafka/PrivateLink Traffic

- **TFC Agent Security Group** with egress rules for:
  - HTTPS (443) and Kafka (9092) to each workload VPC CIDR
  - DNS (UDP/TCP 53) to DNS VPC CIDR specifically
  - General HTTPS/HTTP for Terraform Cloud API and package downloads
- **Confluent PrivateLink Security Group** allowing inbound from TFC Agent SG on ports 443 and 9092

1.2.1.4 AWS VPC Endpoints for Private Service Access

- **Interface endpoints** with private DNS enabled for: Secrets Manager, CloudWatch Logs, ECR API, ECR DKR
- **S3 Gateway endpoint** (required for ECR image layer pulls)
- Dedicated security group for VPC endpoints allowing HTTPS from within VPC
- Eliminates NAT Gateway dependency for AWS service calls

1.2.1.5 ECS Fargate Deployment Pattern

- TFC Agents run in private subnets with `assign_public_ip = false`
- NAT Gateways per AZ for outbound internet (Terraform Cloud API communication)
- Agent token stored in Secrets Manager, fetched via VPC Endpoint
- Container health checks and deployment circuit breaker for reliability

1.2.1.6 IAM Permissions for Infrastructure Management

- Task role with Transit Gateway, VPC, Route53 Resolver, and Client VPN management permissions
- Execution role with Secrets Manager access for agent token retrieval
- KMS permissions scoped to Secrets Manager service for encryption/decryption

1.2.1.7 Network Architecture Summary

- **Hub-and-spoke model**: TGW connects TFC Agent VPC → DNS VPC → Workload VPCs
- **DNS resolution chain**: TFC Agent → Custom DHCP → Centralized DNS VPC → Private Hosted Zones → PrivateLink Endpoint IPs
- **Traffic flow**: TFC Agent → TGW → Workload VPC → PrivateLink Endpoint → Confluent Cloud Kafka

2.0 Project's Architecture Overview

2.1 Key Features Required for Confluent PrivateLink to Work (Confluent Cloud Configuration)

2.1.1 Confluent Private Link Attachment (Environment-Level)

- Single `confluent_private_link_attachment` resource created at the environment level for AWS region
- Provides the `vpc_endpoint_service_name` that AWS VPC Endpoints connect to
- Provides the `dns_domain` (e.g., `*.aws.private.confluent.cloud`) for DNS configuration
- Multiple VPCs can share the same PrivateLink attachment via separate VPC Endpoints

2.1.2 AWS VPC Endpoint Configuration

- Interface VPC Endpoints (`vpc_endpoint_type = "Interface"`) in each workload VPC
- **Critical**: `private_dns_enabled = false` — DNS handled via centralized Private Hosted Zones instead
- Security groups allowing inbound on ports 443 (HTTPS), 9092 (Kafka), and 53 (DNS) from TFC Agent VPC, VPN VPC, VPN Client CIDR, and local VPC CIDR
- Endpoints deployed across multiple AZs (3 subnets) for high availability

2.1.3 Confluent Private Link Attachment Connection

- `confluent_private_link_attachment_connection` links the AWS VPC Endpoint ID to the Confluent PrivateLink attachment
- Creates the bidirectional connection between AWS and Confluent Cloud
- Depends on Route53 zone associations being complete first (`time_sleep` for propagation)

2.1.4 Centralized Private Hosted Zone (PHZ) Strategy

- Single PHZ created for the Confluent DNS domain, associated with **all VPCs** that need access
- **Zonal CNAME records**: `*.{availability-zone-id}.{dns_domain}` → AZ-specific VPC Endpoint DNS
- **Wildcard CNAME record**: `*.{dns_domain}` → Primary VPC Endpoint DNS

2.1.5 Route53 SYSTEM Resolver Rule

- `rule_type = "SYSTEM"` tells Route53 to use Private Hosted Zones for the Confluent domain
- Rule associated with every VPC that needs Confluent access

2.1.6 Transit Gateway Routing

- Each PrivateLink VPC attached to TGW with DNS support enabled
- Route table association AND route propagation configured
- Routes added from PrivateLink VPCs back to all consumer VPCs

2.1.7 Multi-Cluster Architecture with Cluster Linking

- Two Enterprise Kafka clusters (Sandbox and Shared) in the same environment
- Bidirectional Cluster Link with mirror topics for data replication

2.1.8 Service Account & API Key Management

- Separate service accounts per role with API key rotation

- ACLs granting specific permissions per service account
- API keys stored in AWS Secrets Manager

2.1.9 DNS Propagation Timing

- `time_sleep` resources ensuring DNS propagates before dependent resources (1-2 minutes)

2.1.10 Schema Registry Integration

- Stream Governance (Essentials) enabled at environment level with AVRO support

3.0 Let's Get Started

3.1 Deploy the Infrastructure

The deploy.sh script handles authentication and Terraform execution:

```
./deploy.sh create \
  --profile=<SSO_PROFILE_NAME> \
  --confluent-api-key=<CONFLUENT_API_KEY> \
  --confluent-api-secret=<CONFLUENT_API_SECRET> \
  --tfe-token=<TFE_TOKEN> \
  --tgw-id=<TGW_ID> \
  --tgw-rt-id=<TGW_RT_ID> \
  --tfc-agent-vpc-id=<TFC_AGENT_VPC_ID> \
  --tfc-agent-vpc-rt-ids=<TFC_AGENT_VPC_RT_IDS> \
  --tfc-agent-vpc-cidr=<TFC_AGENT_VPC_CIDR> \
  --dns-vpc-id=<DNS_VPC_ID> \
  --vpn-vpc-id=<VPN_VPC_ID> \
  --vpn-vpc-cidr=<VPN_VPC_CIDR> \
  --vpn-client-vpc-cidr=<VPN_CLIENT_VPC_CIDR> \
  --vpn-client-vpc-rt-ids=<VPN_CLIENT_VPC_RT_IDS>
```

3.1.1 Optional Arguments

```
--dns-vpc-cidr=<DNS_VPC_CIDR>    # Default: 10.255.0.0/24
--day-count=<DAY_COUNT>          # Default: 30 (API key rotation interval)
```

```
|
| Error: error creating Cluster Link: 400 Bad Request: A cluster link
already exists with the provided link name: Cluster Link
_fA8DRTZSvGrLkTur7e8-Q already exists.
|
|   with confluent_cluster_link.shared_to_sandbox,
|   on setup-confluent-cluster_linking.tf line 113, in resource
"confluent_cluster_link" "shared_to_sandbox":
|  113: resource "confluent_cluster_link" "shared_to_sandbox" {
```

```
|
|
```

```
confluent kafka link list --cluster lkc-27dvgm --environment env-5y6mpq
```

3.2 Teardown the Infrastructure

```
./deploy.sh destroy \
  --profile=<SSO_PROFILE_NAME> \
  --confluent-api-key=<CONFLUENT_API_KEY> \
  --confluent-api-secret=<CONFLUENT_API_SECRET> \
  --tfe-token=<TFE_TOKEN> \
  --tgw-id=<TGW_ID> \
  --tgw-rt-id=<TGW_RT_ID> \
  --tfc-agent-vpc-id=<TFC_AGENT_VPC_ID> \
  --tfc-agent-vpc-rt-ids=<TFC_AGENT_VPC_RT_IDS> \
  --tfc-agent-vpc-cidr=<TFC_AGENT_VPC_CIDR> \
  --dns-vpc-id=<DNS_VPC_ID> \
  --vpn-vpc-id=<VPN_VPC_ID> \
  --vpn-vpc-cidr=<VPN_VPC_CIDR> \
  --vpn-client-vpc-cidr=<VPN_CLIENT_VPC_CIDR> \
  --vpn-client-vpc-rt-ids=<VPN_CLIENT_VPC_RT_IDS>
```

3.2.1 Handling DNS Resolution Errors During Destroy

If you encounter DNS resolution errors during the destroy process, you may see error messages similar to the following:

```
|
| Error: error deleting Kafka ACLs "lkc-
j6wj9w/TOPIC#sandbox_aws_privatelink_example_#LITERAL#User:sa-
w7xo5n9#*#CREATE#ALLOW": Delete "https://lkc-j6wj9w.us-east-
1.aws.private.confluent.cloud:443/kafka/v3/clusters/lkc-j6wj9w/acls?
host=%2A&operation=CREATE&pattern_type=LITERAL&permission=ALLOW&principal=
User%3Asa-
w7xo5n9&resource_name=sandbox_aws_privatelink_example_&resource_type=TOPIC
": dial tcp: lookup lkc-j6wj9w.us-east-1.aws.private.confluent.cloud on
10.2.0.2:53: no such host
|
|
|

|
| Error: error deleting Kafka ACLs "lkc-
j6wj9w/TOPIC#sandbox_aws_privatelink_example_#LITERAL#User:sa-
```

```
w7xo5n9#*#WRITE#ALLOW": Delete "https://lkc-j6wj9w.us-east-
1.aws.private.confluent.cloud:443/kafka/v3/clusters/lkc-j6wj9w/acls?
host=%2A&operation=WRITE&pattern_type=LITERAL&permission=ALLOW&principal=U
ser%3Asa-
w7xo5n9&resource_name=sandbox_aws_privatelink_example_&resource_type=TOPIC
": dial tcp: lookup lkc-j6wj9w.us-east-1.aws.private.confluent.cloud on
10.2.0.2:53: no such host
│
│
╵

╷
│ Error: error deleting Kafka ACLs "lkc-j6wj9w/CLUSTER#kafka-
cluster#LITERAL#User:sa-w7xo5n9#*#DESCRIBE#ALLOW": Delete "https://lkc-
j6wj9w.us-east-1.aws.private.confluent.cloud:443/kafka/v3/clusters/lkc-
j6wj9w/acls?
host=%2A&operation=DESCRIBE&pattern_type=LITERAL&permission=ALLOW&principa
l=User%3Asa-w7xo5n9&resource_name=kafka-cluster&resource_type=CLUSTER":
dial tcp: lookup lkc-j6wj9w.us-east-1.aws.private.confluent.cloud on
10.2.0.2:53: no such host
│
│
╵

╷
│ Error: error waiting for Kafka Mirror Topic "lkc-99gmp5/bidirectional-
between-sandbox-and-shared/dev-stock_trades" to be deleted: Get
"https://lkc-99gmp5.us-east-
1.aws.private.confluent.cloud:443/kafka/v3/clusters/lkc-
99gmp5/links/bidirectional-between-sandbox-and-shared/mirrors/dev-
stock_trades": dial tcp: lookup lkc-99gmp5.us-east-
1.aws.private.confluent.cloud on 10.2.0.2:53: no such host; could not
parse error details; raw response body: ""
│
│
╵

╷
│ Error: error deleting Kafka ACLs "lkc-j6wj9w/TOPIC#dev-
stock_trades#LITERAL#User:sa-w7xo5n9#*#WRITE#ALLOW": Delete "https://lkc-
j6wj9w.us-east-1.aws.private.confluent.cloud:443/kafka/v3/clusters/lkc-
j6wj9w/acls?
host=%2A&operation=WRITE&pattern_type=LITERAL&permission=ALLOW&principal=U
ser%3Asa-w7xo5n9&resource_name=dev-stock_trades&resource_type=TOPIC": dial
tcp: lookup lkc-j6wj9w.us-east-1.aws.private.confluent.cloud on
10.2.0.2:53: no such host
│
│
╵

Operation failed: failed running terraform apply (exit 1)
```

If you encounter DNS resolution errors during the destroy process, do the following:

Navigate to the Terraform directory:

```
cd terraform
```

***Remove the unreachable resources from the Terraform state:**

```
terraform state rm
'confluent_kafka_acl.sandbox_cluster_app_connector_describe_on_cluster'
terraform state rm
'confluent_kafka_acl.sandbox_cluster_app_connector_write_on_target_topic'
terraform state rm
'confluent_kafka_acl.sandbox_cluster_app_connector_create_on_data_preview_
topics'
terraform state rm
'confluent_kafka_acl.sandbox_cluster_app_connector_write_on_data_preview_t
opics'
terraform state rm 'confluent_cluster_link.sandbox_and_shared'
terraform state rm 'confluent_kafka_topic.source_stock_trades'
terraform state rm 'confluent_kafka_mirror_topic.stock_trades_mirror'
terraform state rm 'confluent_cluster_link.shared_to_sandbox'
```

Navigate back to the root directory:

```
cd ..
```

Rerun the destroy command:

```
./deploy.sh destroy \
  --profile=<SSO_PROFILE_NAME> \
  --confluent-api-key=<CONFLUENT_API_KEY> \
  --confluent-api-secret=<CONFLUENT_API_SECRET> \
  --tfe-token=<TFE_TOKEN> \
  --tgw-id=<TGW_ID> \
  --tgw-rt-id=<TGW_RT_ID> \
  --tfc-agent-vpc-id=<TFC_AGENT_VPC_ID> \
  --tfc-agent-vpc-rt-ids=<TFC_AGENT_VPC_RT_IDS> \
  --tfc-agent-vpc-cidr=<TFC_AGENT_VPC_CIDR> \
  --dns-vpc-id=<DNS_VPC_ID> \
  --vpn-vpc-id=<VPN_VPC_ID> \
  --vpn-vpc-cidr=<VPN_VPC_CIDR> \
  --vpn-client-vpc-cidr=<VPN_CLIENT_VPC_CIDR> \
  --vpn-client-vpc-rt-ids=<VPN_CLIENT_VPC_RT_IDS>
```

4.0 Resources

4.1 Terminology

- **PHZ**: Private Hosted Zone - AWS Route 53 Private Hosted Zone is a DNS service that allows you to create and manage private DNS zones within your VPCs.
- **TFC**: Terraform Cloud - A service that provides infrastructure automation using Terraform.
- **VPC**: Virtual Private Cloud - A virtual network dedicated to your AWS account.
- **AWS**: Amazon Web Services - A comprehensive cloud computing platform provided by Amazon.
- **CC**: Confluent Cloud - A fully managed event streaming platform based on Apache Kafka.
- **PL**: PrivateLink - An AWS service that enables private connectivity between VPCs and services.
- **IaC**: Infrastructure as Code - The practice of managing and provisioning computing infrastructure through machine-readable definition files.

4.2 Related Documentation

- AWS PrivateLink Overview in Confluent Cloud
- Use AWS PrivateLink for Serverless Products on Confluent Cloud
- GitHub Sample Project for Confluent Terraform Provider PrivateLink Attachment
- Geo-replication with Cluster Linking on Confluent Cloud
- Use the Confluent Cloud Console with Private Networking
- IP Filtering on Confluent Cloud
- AWS/Azure PrivateLink Networking Course
- Hands On: Configuring a PrivateLink Cluster