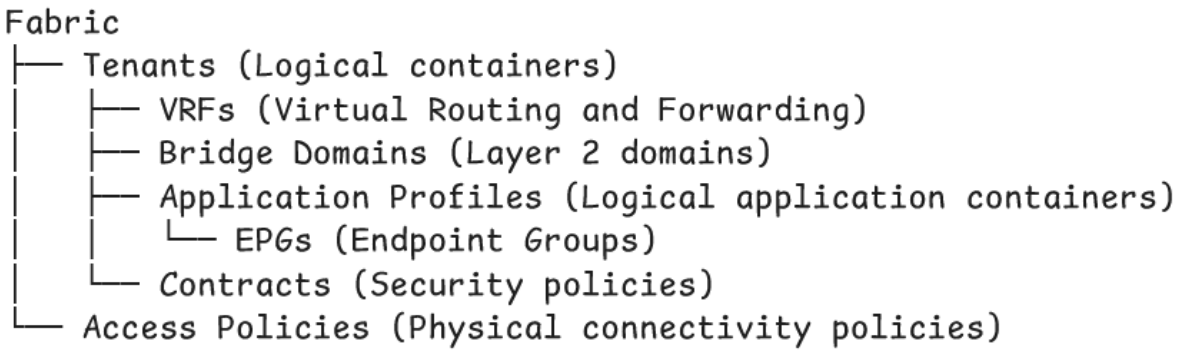
ACI & APIC

1. **ACI**
   - Spine and leaf switch topology is provisioned and managed as a single entity.
   - Everything is configured through policies
   - Single point of management for entire fabric
2. **APIC**
   - Point of automation and management for the Cisco ACI fabric, policy enforcement, and health monitoring
   - Pushes configurations to all fabric nodes
3. **ACI Fabric**
   - **Spine Switches**: High-performance switching nodes that provide connectivity between leaf switches
   - **Spine Switches**: Access layer switches that connect endpoints (servers, storage, etc.)
   - **APIC Controllers:** Management and policy controllers.



3.1. Tenants
   - Logical segmentation
   - All networking and policy objects for a specific tenant

3.2. Virtual Routing and Forwarding
   - Provides Layer 3 isolation
   - Contains multiple bridge domains
   - Route isolation between VRFs
   - Independent routing tables
   - Inter-VRF communication requires contracts

3.3. Bridge Domains
   - Layer 2 broadcast domain
   - Control ARP broadcast behavior
   - Layer 3 gateway addresses

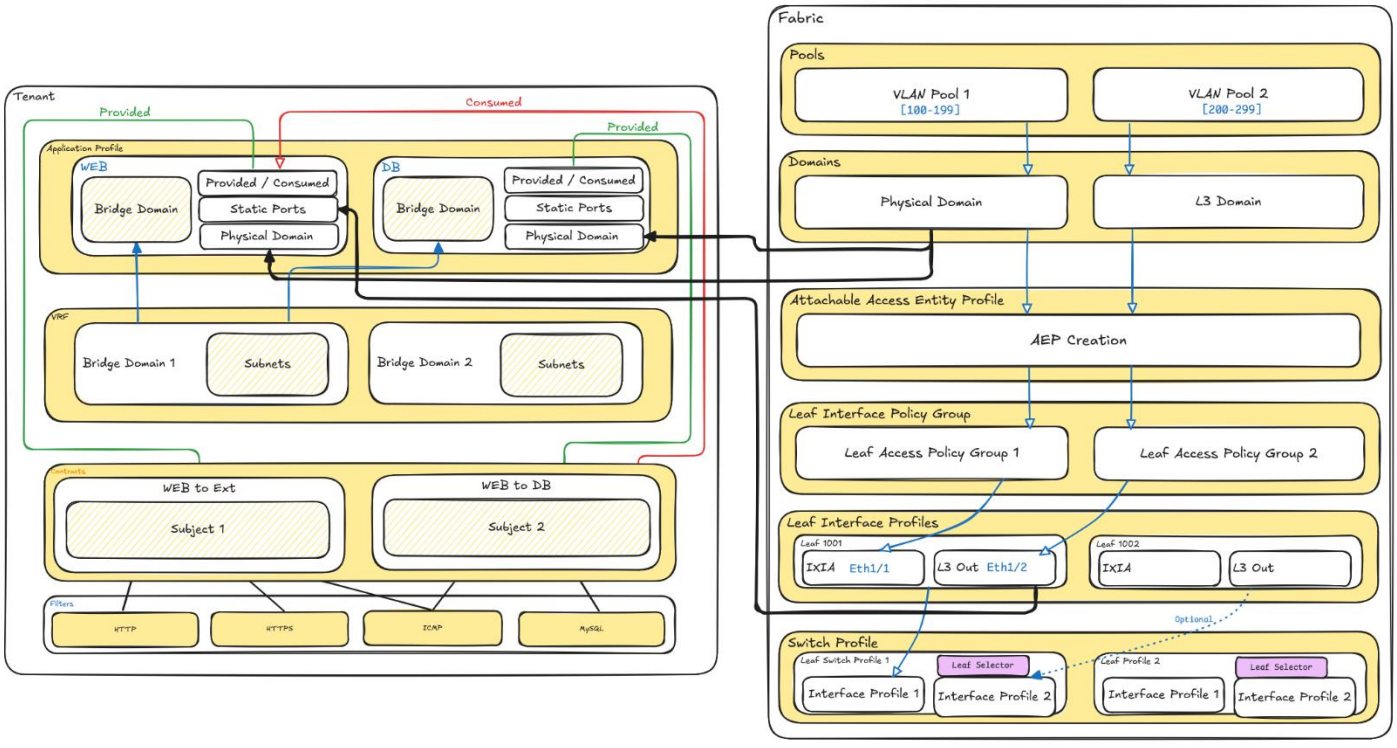
3.4. Application Profiles

- Logical container for related EPGs
- Groups EPGs that belong to the same application

3.5. Endpoint Groups

- fabric learns of the EPG through a discovery process
- Each EPG must be associated with a BD
- Physical or virtual domain binding
- Security policies applied to EPG communication

4. Contracts
    - Define communication policies between EPGs
    - **Subjects**: Logical grouping of filters
    - **Filters**: Define specific protocols/ports
    - **Contract Scope**: Tenant, VRF, or Global
5. ACI Domains
    - Physical Domain: For bare-metal servers
    - L3 Domain: For external Layer 3 connectivity
    - L2 Domain: For external Layer 2 connectivity
    - Components:
        - ➢ VLAN Pools: Range of VLANs available to the domain
        - ➢ Physical Domain Profile: Links EPGs to physical infrastructure
        - ➢ Attachable Entity Profile (AEP): Maps domains to physical interface.



Tenant creation in APIC GUI:

Tenant Creation Outline

VLAN Pool
Physical Domain
AEP
Interface Profile
Interface Policy Group
Switch Profile
Tenant
VRF
BD
Subnet
Application Profile
EPG
Domain Association
Static Path
Filters
Contracts
Subject Filters
EPG Contracts

1: Infrastructure Setup

- Create VLAN Pool: 'Lab_VLAN_Pool'
- Create Physical Domain: 'PhysDom_Lab_Dhanush'
- Create AEP: 'AEP_Lab_Dhanush'
- Create Interface Profile: 'IntProfile_Lab'
- Create Interface Policy Group: 'IntPG_Lab'
- Create Switch Profile: 'SwProfile_Lab'

1. Create VLAN Pool: 'Lab_VLAN_Pool'
   - Navigate: Fabric → Access Policies → Pools → VLAN
   - Right-click on VLAN → Create VLAN Pool
   - Name: Lab_VLAN_Pool
   - Allocation Mode: Static
   - Add Range: 150-160
   - Submit

2. Create Physical Domain: 'PhysDom_Lab_Dhanush'
   - Navigate: Fabric → Access Policies → Physical & External Domains
   - Right-click Physical Domains → Create Physical Domain
   - Name: PhysDom_Lab_Dhanush
   - Associate VLAN Pool: Lab_VLAN_Pool
   - Submit

3. Create AEP: 'AEP_Lab_Dhanush'
   - Navigate: Fabric → Access Policies → Global Policies → Attachable Access Entity Profiles
   - Right-click AEP → Create Attachable Access Entity Profile
   - Name: AEP_Lab_Dhanush
   - Add Domain Association → Select Physical Domain: PhysDom_Lab_Dhanush
   - Submit

4. Create Interface Profile: 'IntProfile_Lab'
   - Navigate: Fabric → Access Policies → Interfaces → Leaf Interfaces → Profiles
   - Right-click Interface Profiles → Create Interface Profile
   - Name: IntProfile_Lab
   - Add Interface Selectors → Add eth1/1, eth1/2
   - Submit

5. Create Interface Policy Group: 'IntPG_Lab'
   - Navigate: Fabric → Access Policies → Interfaces → Leaf Interfaces → Policy Groups
   - Right-click Policy Groups → Create Interface Policy Group
   - Name: IntPG_Lab
   - Link Type: Link
   - Associate AEP: AEP_Lab_Dhanush
   - Submit

6. Create Switch Profile: 'SwProfile_Lab'
   - Navigate: Fabric → Access Policies → Switches → Leaf Switches → Profiles
   - Right-click Switch Profiles → Create Switch Profile
   - Name: SwProfile_Lab
   - Associate Interface Profile: IntProfile_Lab
   - Select Leaf 1001
   - Submit

2: Tenant Configuration

- Create Tenant: 'LAB_TENANT_Dhanush'
- Create VRF: 'LAB_VRF_Dhanush'
- Create Bridge Domain: 'LAB_BD'
- Add Subnet to BD: '192.168.100.1/24'

1. Create Tenant: 'LAB_TENANT_Dhanush'
   - Navigate: Tenants
   - Right-click Tenants → Create Tenant
   - Name: LAB_TENANT_Dhanush
   - Submit

2. Create VRF: 'LAB_VRF_Dhanush'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Networking → VRFs
   - Right-click VRFs → Create VRF
   - Name: LAB_VRF_Dhanush
   - Policy Control Enforcement: Enforced
   - Submit

3. Create Bridge Domain: 'LAB_BD'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Networking → Bridge Domains
   - Right-click Bridge Domains → Create Bridge Domain
   - Name: LAB_BD
   - Associate VRF: LAB_VRF_Dhanush
   - L2 Unknown Unicast: Proxy
   - Submit

4. Add Subnet to BD: '192.168.100.1/24'
   - Select LAB_BD → Subnets tab
   - Add Subnet
   - IP Address: 192.168.100.1/24
   - Scope: Private
   - Submit

3: Application Profile and EPGs

- Create Application Profile: 'LAB_APP_Dhanush'
- Create EPG: 'WEB_EPG_Dhanush'
- Create EPG: 'DB_EPG_Dhanush'
- Associate EPGs to Physical Domain
- Add Static Path Binding for WEB_EPG
- Add Static Path Binding for DB_EPG

1. Create Application Profile: 'LAB_APP_Dhanush'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Application Profiles
   - Right-click Application Profiles → Create Application Profile
   - Name: LAB_APP_Dhanush
   - Submit

2. Create EPG: 'WEB_EPG_Dhanush'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Application Profiles → LAB_APP_Dhanush
   - Right-click Application EPGs → Create Application EPG
   - Name: WEB_EPG_Dhanush
   - Associate Bridge Domain: LAB_BD
   - Submit

3. Create EPG: 'DB_EPG_Dhanush'
   - Right-click Application EPGs → Create Application EPG
   - Name: DB_EPG_Dhanush
   - Associate Bridge Domain: LAB_BD
   - Submit

4. Associate EPGs to Physical Domain
   - Select WEB_EPG_Dhanush → Domains tab
   - Associate Domain → Select: PhysDom_Lab_Dhanush
   - Submit
   - Repeat for DB_EPG_Dhanush

5. Add Static Path Binding for WEB_EPG
   - Select WEB_EPG_Dhanush → Static Paths tab
   - Add Static Path
   - Node: Leaf 1001
   - Interface: eth1/1
   - Encapsulation: VLAN-150
   - Submit

6. Add Static Path Binding for DB_EPG
   - Select DB_EPG_Dhanush → Static Paths tab
   - Add Static Path
   - Node: Leaf 1001
   - Interface: eth1/2
   - Encapsulation: VLAN-160
   - Submit

4: Creating Filters

- Create Filter: 'HTTP_FILTER'
- Create Filter: 'HTTPS_FILTER'
- Create Filter: 'MYSQL_FILTER'
- Create Filter: 'ICMP_FILTER'

1. Create Filter: 'HTTP_FILTER'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Security Policies → Filters
   - Right-click Filters → Create Filter
   - Name: HTTP_FILTER
   - Add Entry → Name: HTTP_Entry
   - EtherType: IP
   - Protocol: TCP
   - Destination Port: 80
   - Submit

2. Create Filter: 'HTTPS_FILTER'
   - Right-click Filters → Create Filter
   - Name: HTTPS_FILTER
   - Add Entry → Name: HTTPS_Entry
   - EtherType: IP
   - Protocol: TCP
   - Destination Port: 443
   - Submit

3. Create Filter: 'MYSQL_FILTER'
   - Right-click Filters → Create Filter
   - Name: MYSQL_FILTER
   - Add Entry → Name: MySQL_Entry
   - EtherType: IP
   - Protocol: TCP
   - Destination Port: 3306
   - Submit

4. Create Filter: 'ICMP_FILTER'
   - Right-click Filters → Create Filter
   - Name: ICMP_FILTER
   - Add Entry → Name: ICMP_Entry
   - EtherType: IP
   - Protocol: ICMP
   - Submit

5: Creating Contracts and Associating

- Create Contract: 'EXT_TO_WEB_CONTRACT'
- Associate Filters to EXT_TO_WEB_SUBJECT
- Create Contract: 'WEB_TO_DB_CONTRACT'
- Associate Filters to WEB_TO_DB_SUBJECT
- Configure WEB_EPG Contracts
- Configure DB_EPG Contracts

1. Create Contract: 'EXT_TO_WEB_CONTRACT'
   - Navigate: Tenants → LAB_TENANT_Dhanush → Security Policies → Contracts
   - Right-click Contracts → Create Contract
   - Name: EXT_TO_WEB_CONTRACT
   - Add Subject → Name: EXT_TO_WEB_SUBJECT
   - Submit

2. Associate Filters to EXT_TO_WEB_SUBJECT
   - Select EXT_TO_WEB_SUBJECT → Associated Filters tab
   - Add Filter → Select: HTTP_FILTER
   - Add Filter → Select: HTTPS_FILTER
   - Add Filter → Select: ICMP_FILTER
   - Submit

3. Create Contract: 'WEB_TO_DB_CONTRACT'
   - Right-click Contracts → Create Contract
   - Name: WEB_TO_DB_CONTRACT
   - Add Subject → Name: WEB_TO_DB_SUBJECT
   - Submit

4. Associate Filters to WEB_TO_DB_SUBJECT
   - Select WEB_TO_DB_SUBJECT → Associated Filters tab
   - Add Filter → Select: MYSQL_FILTER
   - Add Filter → Select: ICMP_FILTER
   - Submit

Navigate: Tenants → LAB_TENANT_Dhanush → Application Profiles → LAB_APP_Dhanush

5. Configure WEB_EPG Contracts
   - Navigate: Application EPGs → WEB_EPG_Dhanush
   - Provided Contracts tab → Add Contract → Select: EXT_TO_WEB_CONTRACT
   - Consumed Contracts tab → Add Contract → Select: WEB_TO_DB_CONTRACT
   - Submit

6. Configure DB_EPG Contracts
   - Navigate: Application EPGs → DB_EPG_Dhanush
   - Provided Contracts tab → Add Contract → Select: WEB_TO_DB_CONTRACT
   - Submit