**Cisco ISE Modes of Operation**:

**1. Standalone Mode**

* **Purpose**: All services run on a single node.
* **Use Case**: Lab, proof-of-concept, or small environments with minimal redundancy needs.
* **Services**: PAN + MnT + PSN on the same node.
* **Limitation**: No redundancy or scalability.

**2. Distributed Mode**

* **Purpose**: Services are split across multiple nodes for scalability and resilience.
* **Use Case**: Production environments.
* **Node Roles**:
  + **PAN (Policy Administration Node)**:
    - Manages configuration and policy logic.
    - Only **one Primary PAN** active at a time; the **Secondary PAN** acts as backup.
  + **MnT (Monitoring and Troubleshooting Node)**:
    - Collects logs, session data, and generates reports.
    - One Primary and one Secondary MnT node allowed.
  + **PSN (Policy Services Node)**:
    - Performs RADIUS, TACACS+, posture, profiling, guest access, etc.
    - Scalable horizontally; typically many deployed.
  + **pxGrid Node**:
    - Handles pxGrid data exchange with external systems.
    - Often co-located with PSNs.

**3. High Availability (HA) Mode**

* **Purpose**: Enables redundancy for PAN, MnT, and PSNs.
* **HA Details**:
  + **PAN HA**: Primary + Secondary. Manual failover required.
  + **MnT HA**: Primary + Secondary. Manual report retrieval from both nodes may be required.
  + **PSNs**: Active-active load-balanced via RADIUS.

**4. Deployment Personas**

Each ISE node is assigned one or more **personas**, reflecting its function:

| **Persona** | **Function** |
| --- | --- |
| **Administration (PAN)** | Policy definition, configuration, and node management |
| **Monitoring (MnT)** | Logs, alerts, reports, troubleshooting |
| **Policy Services (PSN)** | Runtime services (RADIUS, TACACS+, Guest, BYOD, Profiling, Posture) |
| **pxGrid** | Integration persona for threat intelligence sharing (e.g., with Splunk, Stealthwatch) |

**Note**: PAN and MnT personas cannot be active simultaneously on the same node in production after version 2.x.

**5. Dedicated vs Hybrid Nodes**

* **Dedicated**: One node serves one persona only (e.g., PSN only).
* **Hybrid**: One node serves multiple personas (e.g., PAN + MnT for smaller setups).

**6. ISE PAN-MnT Split**

From ISE 3.1 onward:

* PAN and MnT must run on **separate nodes** in production-grade deployments to meet scale and performance guidelines.