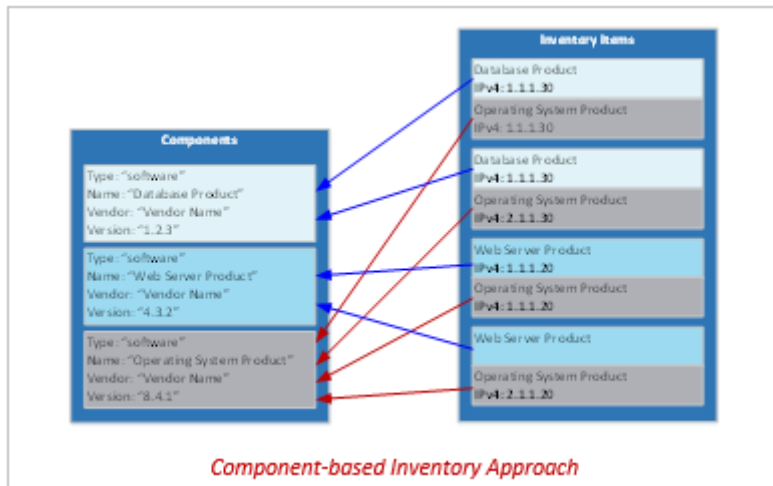


# Inventory: Normalized Approach

The normalized approach is preferred. Organizations starting new with no legacy inventory reporting should use this.

For organizations converting from a legacy FedRAMP inventory spreadsheet template, consider starting with the [Inventory: Flat Approach](#) and migrating to the normalized approach over time.

With the **Normalized approach**, common information is captured once in a component assembly. Each instance of that component has its own inventory-item assembly, which cites the relevant component and only includes information unique to that instance.



## Component-based Representation

```
system-security-plan:
  uuid: 11111111-2222-4000-8000-000000000000

  system-implementation:
    components:
      - uuid: 11111111-2222-4000-8000-009000300300
        type: software
        title: Linux Operating System
        description: This is a web server that communicates with a database via an encrypted
connection
        props:
```

- name: asset-type  
value: operating-system
- name: allows-authenticated-scan  
value: 'yes'
- name: scan-type  
ns: http://fedramp.gov/ns/oscal  
value: web

links:

- href: '#11111111-2222-4000-8000-001000000059'  
rel: baseline

status:

state: operational

inventory-items:

- uuid: 11111111-2222-4000-8000-011000000023  
description: Instance of the Linux Operating System  
props:
  - name: asset-id  
value: unique-asset-ID-23
  - name: asset-type  
value: operating-system
  - name: ipv4-address  
value: 10.23.23.23
  - name: ipv6-address  
value: 0000:0000:0000:0000:0000:ffff:0a17:1717
  - name: virtual  
value: 'yes'
  - name: public  
value: 'no'
  - name: fqdn  
value: linux-host.example.internal
  - name: physical-location  
value: Primary Data Center
  - name: is-scanned  
value: 'yes'
  - name: scan-type  
ns: http://fedramp.gov/ns/oscal  
value: infrastructure

responsible-parties:

- role-id: asset-owner

party-uuids:

- 11111111-2222-4000-8000-004000000010

- role-id: asset-administrator

party-uuids:

- 11111111-2222-4000-8000-004000000017

implemented-components:

- component-uuid: 11111111-2222-4000-8000-009000300300

## Notes:

- If component-sample is an image of a Linux virtual machine (VM), and 10 instances of that VM are in use, there would be one (1) component assembly and ten (10) inventory-item assemblies, all referencing the same component.

## Inventory Data Locations and XPath Queries

The following queries are intended to show where to find each piece of information within the system inventory template.

|                 |                         | Guidance                                                                                                                                                                                                                                                                                                                                                                                                                            | Valid Values           | Requirement                                                                         | Component | Inventory-Item | OSCAL Cardinality | Data Location: XPath Notation (CASE SENSITIVE)                                                                                                                                                                 | NOTES                                                                                                                                                                  |
|-----------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------------------------|-----------|----------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All Inventories | UNIQUE ASSET IDENTIFIER | Unique Identifier associated with the asset. This Identifier should be used consistently across all documents, 3PAOs artifacts, and any vulnerability scanning tools. For OS/Infrastructure and Web Application Software, this is typically an IP address or URL/DNS name. For a database, it is typically an IP address, URL, or database name. A CSP's own naming scheme is also acceptable as long as it has unique identifiers. | Must be unique.        | Mandatory for all inventory records.                                                |           | X              | 1                 | <pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="asset-id"]/@value</pre><br>OR<br><pre>/*/system-implementation/component/prop[@name="asset-id"]/@value</pre>                         | The system-specific "Unique Asset Identifier" must be set as the asset-id flag on the inventory-item field.                                                            |
|                 | IPv4 or IPv6 Address    | If available, state the IPv4 or IPv6 address of the inventory item. This can be left blank if one does not exist, or if it is a dynamic field. If the IP address is used as the Unique Asset Identifier, then this field will duplicate the contents of the Unique Asset Identifier column.<br><br>If a device has multiple IP addresses, then include one row in this inventory for each IP address.                               |                        | Optional, unless used as identifier in vulnerability scans or security assessments. |           | X              | 0 - ∞             | <pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="ipv4-address"]/@value</pre><br><pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="ipv6-address"]/@value</pre> | One prop field per IP address, if more than one.                                                                                                                       |
|                 | Virtual                 | Is this asset virtual?                                                                                                                                                                                                                                                                                                                                                                                                              | Yes or No.             | Mandatory for OS/Infrastructure, Software, and Database.                            | X         | X              | 1                 | <pre>/*/system-implementation/component/prop[@name="virtual"]/@value</pre><br><pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="virtual"]/@value</pre>                                 | Must have "Virtual" at the inventory item-level either explicitly, or via a linked component.<br><br>May define it at component level and propagate to inventory-item. |
|                 | Public                  | Is this asset a public facing device? That is, is it outside the boundary? If so, it is an entry point.                                                                                                                                                                                                                                                                                                                             | Yes or No.             | Mandatory for OS/Infrastructure, Software, and Database.                            |           | X              | 1                 | <pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="public"]/@value</pre>                                                                                                                |                                                                                                                                                                        |
|                 | DNS Name or URL         | If available, state the DNS name or URL of the inventory item. This can be left blank if one does not exist, or it is a dynamic field.                                                                                                                                                                                                                                                                                              | Valid DNS name or URL. | Optional, unless used as identifier in vulnerability scans or security assessments. |           | X              | 0 - ∞             | <pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="fqdn"]/@value</pre><br><pre>/*/system-implementation/system-inventory/inventory-item/prop[@name="uri"]/@value</pre>                  | May use either DNS name, URL, or both. Use a separate prop field for each DNS name and/or URL.                                                                         |

|                             |                             | Guidance                                                                                                                | Valid Values                            | Requirement                                                             | Component | Inventory-Item | OSCAL Cardinality | Data Location: XPath Notation (CASE SENSITIVE)                                                                                                                                                                                                                                                                                                                                                                                | NOTES                                                                                                                                                                                                                                                                                         |
|-----------------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------|-----------|----------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| OS/Infrastructure Inventory | NetBIOS Name                | If available, state the NetBIOS name. May be left blank if one does not exist, or dynamic.                              | Valid NetBIOS name.                     | Optional, unless used as identifier in scans or security assessments.   |           | X              | 0 - ∞             | <code>/*system-implementation/system-inventory/inventory-item/prop[@name="netbios-name"]/@value</code>                                                                                                                                                                                                                                                                                                                        | One prop field per NetBIOS name, if more than one.                                                                                                                                                                                                                                            |
|                             | MAC Address                 | If available, state the MAC Address. May be left blank if one does not exist, or dynamic.                               | Valid MAC Address.                      | Optional, unless used as identifier in scans or security assessments.   |           | X              | 0 - ∞             | <code>/*system-implementation/system-inventory/inventory-item/prop[@name="mac-address"]/@value</code>                                                                                                                                                                                                                                                                                                                         | One prop field per MAC address, if more than one.                                                                                                                                                                                                                                             |
|                             | Authenticated Scan          | Is the asset is planned for an authenticated scan?                                                                      | Yes or No.                              | Mandatory for OS/Infrastructure. Leave blank for Software and Database. | X         | X              | 1                 | <code>/*system-implementation/component/prop[@name="allows-authenticated-scan"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="allows-authenticated-scan"]/@value</code>                                                                                                                                                                                                          | Must have "Authenticated-Scan" at the inventory-item level either explicitly or via a linked component.<br>May define it at component level and propagate to inventory-item.                                                                                                                  |
|                             | Baseline Configuration Name | If available, provide the name of the configuration template used within the CSP configuration management.              |                                         | Mandatory for OS/Infrastructure. Leave blank for Software and Database. | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="baseline-configuration-name"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="baseline-configuration-name"]/@value</code>                                                                                                                                                                                                      | Must have "Baseline Configuration Name" at the inventory-item level either explicitly or via a linked component.<br>May define it at component level and propagate to inventory-item.                                                                                                         |
|                             | OS Name and Version         | Operating System Name and Version running on the asset.                                                                 |                                         | Optional for OS/Infrastructure. Leave blank for Software and Database.  |           | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="software-name"][@ns="https://fedramp.gov/ns/oscal"]/@value</code><br><code>/*system-implementation/component/prop[@name="version"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="software-name"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="software-version"]/@value</code> | Use software name and version and set asset-type of "os".<br>Required for operating systems.<br>Must have "OS Name and Version" at the inventory-item level either explicitly or via a linked component. May define it at the component level and propagate to inventory item.                |
|                             | Location                    | Physical location of hardware. Could include Data Center ID, Cabinet, Racklet or other meaningful location identifiers. | Valid locations for CSP infrastructure. | Optional for OS/Infrastructure. Leave blank for Software and Database.  |           | X              | 0 or 1            | <code>/*system-implementation/system-inventory/inventory-item/prop[@name="physical-location"]/@value</code>                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                               |
|                             | Asset Type                  | Simple description of the asset's function (e.g., Router, Storage Array, DNS Server, etc.)                              |                                         | Mandatory for OS/Infrastructure. Leave blank for Software and Database. | X         | X              | 1                 | <code>/*system-implementation/component/prop[@name="asset-type"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="asset-type"]/@value</code>                                                                                                                                                                                                                                        | Must use an Accepted Value (see Registry) if an applicable one exists.<br>Must have "Asset Type" at the inventory-item level either explicitly or via a linked component. May define it at component level and propagate to inventory-item.                                                   |
|                             | Hardware Make/Model         | Name of the hardware product and model.                                                                                 |                                         | Mandatory for OS/Infrastructure. Leave blank for Software and Database. | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="vendor-name"]/@value</code><br><code>/*system-implementation/component/prop[@name="model"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="vendor-name"][@ns="https://fedramp.gov/ns/oscal"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="hardware-model"]/@value</code>         | Must have "Hardware Vendor" and "Hardware Model" at the inventory item-level either explicitly, or via a linked component. May define it at component level and propagate to inventory-item.<br><b>NOTE:</b> @name="model" at component level, but @name="hardware-model" at inventory level. |
|                             | In Latest Scan              | Should the asset appear in the network scans, and can it be probed by the scans creating the current POA&M?             | Yes or No.                              | Mandatory for OS/Infrastructure. Leave blank for Software and Database. |           | X              | 1                 | <code>/*system-implementation/system-inventory/inventory-item/prop[@name="is-scanned"]/@value</code>                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                               |

|                                   |                                  | Guidance                                                                                    | Valid Values                                                                         | Requirement                                                             | Component | Inventory-Item | OSCAL Cardinality | Data Location: XPath Notation (CASE SENSITIVE)                                                                                                                                                                                                                                                                                                                                                                                | NOTES                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|----------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------|----------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Software and Database Inventories | Software/Database Vendor         | Name of Software or Database vendor.                                                        | If open source (e.g., there is no "vendor"), enter "Open Source" as the vendor name. | Mandatory for Software and Database. Leave blank for OS/Infrastructure. | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="vendor-name"][@ns="https://fedramp.gov/ns/oscal"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="vendor-name"][@ns="https://fedramp.gov/ns/oscal"]/@value</code>                                                                                                                                                              | Must have "Software/Database Vendor" at the inventory-item level either explicitly or via a linked component.<br>May define it at component level and propagate to inventory-item.                                                                                                                        |
|                                   | Software/Database Name & Version | Name of Software or Database product and version number.                                    |                                                                                      | Mandatory for Software or Database. Leave blank for OS/Infrastructure.  | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="software-name"][@ns="https://fedramp.gov/ns/oscal"]/@value</code><br><code>/*system-implementation/component/prop[@name="version"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="software-name"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="software-version"]/@value</code> | Required for software or database. Omit for OS/Infrastructure                                                                                                                                                                                                                                             |
|                                   | Patch Level                      | If applicable.                                                                              |                                                                                      | Optional if applicable. Otherwise, leave blank.                         | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="patch-level"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="software-patch-level"]/@value</code>                                                                                                                                                                                                                             | The "Patch Level" may be specified at the component or inventory-item level.                                                                                                                                                                                                                              |
|                                   | Function                         | For Software or Database, the function provided by the Software or Database for the system. |                                                                                      | Mandatory for Software or Database. Leave blank for OS/Infrastructure.  | X         | X              | 0 or 1            | <code>/*system-implementation/component/prop[@name="function"]/@value</code><br><code>/*system-implementation/component/prop[@name="function"]/remarks</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="function"]/@value</code><br><code>/*system-implementation/system-inventory/inventory-item/prop[@name="function"]/remarks</code>                                                    | Must have a brief, text-base "function" description in the value flag at the inventory item-level.<br>May define it at component level and propagate to inventory-item.<br>May have a separate "function" at the component level.<br>May have an expanded, formatted function description in the remarks. |

|               |                                 | Guidance                                                                                                     | Valid Values                  | Requirement                                                                      | Component | Inventory Item | OSCAL Cardinality | Data Location: XPath Notation (CASE SENSITIVE)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | NOTES                                                                                                                                                                                                                             |
|---------------|---------------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------|----------------------------------------------------------------------------------|-----------|----------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Any Inventory | Comments                        | Any additional information that could be useful to the reviewer.                                             |                               | Optional for OS/Infrastructure, Software and Database.                           | X         | X              | 0 or 1            | /*/system-implementation/component/remarks<br>/*/system-implementation/system-inventory/inventory-item/remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | May have comments in either the component level, inventory-item level, or both.                                                                                                                                                   |
|               | Serial #/Asset Tag#             | Product serial number or internal asset tag #.                                                               |                               | Optional for OS/Infrastructure, Software, and Database.                          |           | X              | 0 or 1            | /*/system-implementation/system-inventory/inventory-item/prop[@name="serial-number"]/@value<br>/*/system-implementation/system-inventory/inventory-item/prop[@name="asset-tag"]/@value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                   |
|               | VLAN/Network ID                 | Virtual LAN or Network ID.                                                                                   |                               | Optional for OS/Infrastructure, Software, and Database.                          |           | X              | 0 - ∞             | /*/system-implementation/system-inventory/inventory-item/prop[@name="vlan-id"]/@value<br>/*/system-implementation/system-inventory/inventory-item/prop[@name="network-id"]/@value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                   |
|               | System Administrator/Owner      | Name of the system administrator or owner.                                                                   |                               | Mandatory for HIGH impact systems. Optional for Low and Moderate impact systems. | X         | X              | 0 - ∞             | COMPONENT OWNER (Person):<br>/*/metadata/party[@uuid="*/system-implementation/component/responsible-role[@role-id="asset-owner"]/@party-uuid]/name<br>COMPONENT ADMINISTRATOR (Org):<br>/*/metadata/party[@uuid="*/system-implementation/component/responsible-role[@role-id="asset-administrator"]/@party-uuid]/name<br>INVENTORY ITEM OWNER (Person):<br>/*/metadata/party[@uuid="*/system-implementation/system-inventory/inventory-item/responsible-party[@role-id="asset-owner"]/@party-uuid]/name<br>INVENTORY ITEM ADMINISTRATOR (Org):<br>/*/metadata/party[@uuid="*/system-implementation/system-inventory/inventory-item/responsible-party[@role-id="asset-administrator"]/@party-uuid]/name | Must have "System Owner/Administrator" at the inventory item-level.<br><br>May define it at component level and propagate to inventory-item.<br><br>May have a separate "system owner/administrator" at the component level.      |
|               | Application Administrator/Owner | Name of the application administrator or owner.                                                              |                               | Optional for OS/Infrastructure, Software, and Database.                          | X         | X              | 0 - ∞             | COMPONENT OWNER:<br>/*/metadata/party[@uuid="*/system-implementation/component/responsible-role[@role-id="asset-owner"]/@party-uuid]/name<br>COMPONENT ADMINISTRATOR:<br>/*/metadata/party[@uuid="*/system-implementation/component/responsible-role[@role-id="asset-administrator"]/@party-uuid]/name<br>INVENTORY ITEM OWNER:<br>/*/metadata/party[@id="*/system-implementation/system-inventory/inventory-item/responsible-party[@role-id="asset-owner"]/@party-id]/person/person-name<br>INVENTORY ITEM ADMINISTRATOR:<br>/*/metadata/party[@uuid="*/system-implementation/system-inventory/inventory-item/responsible-party[@role-id="asset-administrator"]/@party-uuid]/name                     | Must have "Application Owner/Administrator" at the inventory item-level.<br><br>May define it at component level and propagate to inventory-item.<br><br>May have a separate "system owner/administrator" at the component level. |
| ADDITIONAL    | Scan Type                       | Indicate which scan type(s) the item is subjected to.                                                        | infrastructure, database, web | Mandatory                                                                        | X         | X              | 1 - ∞             | /*/system-implementation/component/prop[@name="scan-type"]<br>[{@ns="https://fedramp.gov/ns/oscal"}]/@value<br>/*/system-implementation/system-inventory/inventory-item/prop[@name="scan-type"] [{@ns="https://fedramp.gov/ns/oscal"}]/@value                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Valid values: infrastructure, web, database.<br><br>If more than one type is applicable, use one field per type.                                                                                                                  |
|               | FIPS 140-2 Validation           | Indicate the certificate information for an inventory item with a FIPS 140-2 validated cryptographic module. | component-id                  | Mandatory for any item involving cryptography. Omit otherwise.                   | X         | X              | 1w - ∞            | /*/system-implementation/component/prop[@name="validation"]<br>[{@ns="https://fedramp.gov/ns/oscal"}]/@value<br>/*/system-implementation/system-inventory/inventory-item/prop[@name="validation"] [{@ns="https://fedramp.gov/ns/oscal"}]/@value                                                                                                                                                                                                                                                                                                                                                                                                                                                        | If an item has more than one cryptographic module, use one entry per validation certificate.<br><br>May define "FIPS 140-2 validation" at the component level and propagate to the inventory-item level.                          |

Revision #10

Created 2026-02-11 23:56:13 UTC by Brian Ruf

Updated 2026-04-07 15:09:07 UTC by Brian Ruf