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Allegro® X Pulse Basic Configuration Concepts

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Contents

1

Pulse Enterprise System

When organizations move to enterprise levels, it becomes essential to have an ECAD management system in place that supports the following functions:

- Collaborative work environment
- Library data management
- Design data management
- Inclusion of non-ECAD engineers
- Top-down driven workflows and methodologies
- Analytics
- Integration with:
  - External systems enabling ECAD-MCAD integrations
  - PLM systems for collaborating with manufacturing teams

To facilitate these functions, a robust system is required with some of the following characteristics:

- Central container for organization-level data
- Auto-backup of data at a remote location for disaster recovery
- Authentication and authorization
- Globalization of work – secured data access within and across organizations
- Customization of workflows based on the type of projects
- Controlled global environment
- Message broadcasting

What is Allegro X Pulse?

Allegro X Pulse is an enterprise platform that enables organizations (ECAD teams) to support all enterprise-level characteristics for electronics engineers— schematic and layout— and includes non-EDA stakeholders to contribute reviews and view the work-in-progress design as it progresses. It also enables connections to other enterprise data sources, such as manufacturing, reliability, availability and cost information to aid the design process.

Goals of Pulse Enterprise System

The *Pulse Enterprise System* focuses on achieving the following goals:

- Centralize organization-level ECAD data
- Manage ECAD data for library, design, and board data
- Provide secured data access
- Support customization
- Include the non-ECAD community
- Integrate with ecosystems such as a PLM system

Enterprise System Terminology

- Servers
- Clients
- Authentications and Authorization
- Roles

Servers

A server is a central, organization-level computing and storage resource that enables users to access—read or write— data with an application software and a web browser. A server being central to an organization is critical to the functioning of an organization. Any downtime can negatively impact the entire organization by bringing work to a halt. An understanding of various server types supported by Pulse helps in better management of the Pulse primary node.

In general, server maintenance is done by administrators—ECAD and IT—because it impacts everyone in the organization. The following types of servers comprise the Pulse enterprise system:

- Production Server – The server that hosts the main Pulse applications and website content for deployment to the live environment. It is the live main server of the Pulse enterprise system that is configured to restrict access to authorized users and to limit control to system administrators.
- The server can cater to a variety of users including electrical engineers, layout designers, librarians and non-ECAD stakeholders, that is, web participants.
- Staging or Test Server – A near-exact replica of the production environment for new software releases or patch testing before deployment to the production server. The staging server can also be used to:
  - Experiment with new methodologies or conduct trial runs on a large scale
  - Test software builds and updates to ensure quality under a production-like environment prior to the actual application deployment on the production server
- Cluster Server – A group of Pulse data nodes with a primary node, suitable for large organizations with multiple designers located in different geographies. Clusters generally help you avoid network latency issues when users access design or library data. Any number of clients or sites can connect to the primary and data nodes.
- PLM Server – Various organizations publish the final design, boards, manufacturing outputs, Bill of Materials, 3D models to Product Lifecycle Management (PLM) systems. The Cadence out-of-the-box solution supports PLM servers such as PTC Windchill or Enovia 3D Experience. The published ECAD content is stored in a PLM system so that non-ECAD team members, including the MCAD team, members of manufacturing services, and external partners can access the data and process it further to serve their purpose. For example, users of the ECAD-MCAD integration flow, manufacturing output flow, or material acquisition flow make use of this data.

  Note: In this document, *PLM server* is used as a generic term instead of a specific type of PLM server.

Clients

A client is a program that connects to a server to access various services, and which in turn provides various features to users:

- Web Participants – This kind of client access is useful for administrators or other users in the organization who need access to ECAD data without having access to ECAD tools, or those unfamiliar with ECAD tools. This enables non-ECAD users, such as component

engineers, program managers, and team managers who access Pulse through the web dashboard from a web browser, to contribute to the ECAD flow.

- Thick Clients – Networked computers connected to the Pulse primary node or clustered using the services provided by the server through applications based on licenses. Such clients enable ECAD library or design users to search and use library data from the server and also manage ECAD library and design or board data. Pulse design data management is integrated with design and board authoring tools, such as System Capture and Allegro X PCB Editor.

Authentications and Authorization

Authentication and authorization are essential security processes used by administrators to secure systems and information. Authentication verifies the identity of users (*who you are*), and authorization determines their access rights (*what you can do*). Authentication involves login and user management, while authorization grants role-based access control (RBAC).

In the Pulse enterprise system, the authentication and authorization process is based on *Keycloak*, which is an open source solution that enables single sign-on (SSO) with Identity and Access Management aimed at modern applications and services.

The Pulse enterprise system supports:

- Federated identity providers, LDAP(S)
- External Identity providers, SAML2
- SAML2 SSO with LDAP(S) user federation
- Cloud-based identity and access management service such as Azure AD
- User authentication and single sign-on PingFederate (for PTC Windchill)
- Secure network connection (SSL/TLS1.2)

Roles

In the Pulse enterprise system, a role has a set of access rights and permissions associated with it. Each user role comes with a different set of capabilities based on what users can access.

For various roles in the Pulse system along with their capabilities, refer to Appendix: Roles in Pulse

The two most powerful roles or anchors in the Pulse enterprise system setup are the ECAD, and IT administrators.

- ECAD administrator – Evaluates and decides on Pulse applications and management. Creates and maintains sites that can include physical locations, regions, or functional areas, such as London, Rome, storage or input devices, or a mix, such as Tokyo, memory. Roles, permissions, and ownership are defined on the Pulse primary node by the ECAD administrator.
- IT administrator – Determines hardware and network resource requirements. Installs and maintains the Pulse cluster—primary and data nodes and the PLM server. Defines server monitoring and maintenance policies. The IT administrator is responsible for decisions such as the type of authentication server and the location of the license server. Other requirements, such as which server is to be used for Pulse deployment, how to deploy, and how to configure all the servers, are also controlled and managed by the IT administrator.

2

Pulse Quick Reference

This section covers some key concepts you should familiarize yourself with.

Identifying High-Level Key Concepts

This section covers the key concepts you need to be familiar with to deploy and maintain the Pulse solution.

High-Level Key Concepts

Anchors	Key Tasks and Description
IT Admin	Determine the deployment environment requirements by: ■ Identifying the production and staging server ■ Identifying the Operating System and its flavor ■ Determining production server configuration: ❑ Single versus Cluster ❑ Design capturing tools used: DE-HDL only, or DE-HDL + OrCAD, or System Capture only, or System Capture + DE-HDL ❑ Layout editors used: PCB Editor, APD Plus ❑ Pulse as a service ■ Determining server host access through Fully Qualified Domain Name (FQDN) ■ Determining network security requirements – Secure Sockets Layer (SSL) ■ Determining authentication and authorizations: ❑ SSO, SAML2, OKTA, PingFederate, Azure AD, LDAP, LDAPS ❑ User role management ■ Determining Pulse primary node location – The connection between the Pulse primary node and the license server should be reliable but can be high latency, if needed.

High-Level Key Concepts

Anchors	Key Tasks and Description
	Identify capacity planning resources by: ■ Assessing capacity planning–computing resource and storage– based on the number of users and the amount of data ■ Fault-tolerant disk infrastructure for data storage Identify server maintenance tasks including: ■ Disk Cleanup policy for logs and old data clean up through the purge policy ■ Component library in Allegro X Pulse ❑ Managed (5X Libraries) ❑ Indexed (5X Libraries or OrCAD libraries) ■ Data Backup for disaster recovery ■ Anti-Virus scanning policy/exceptions to exclude known files ■ Email notification on critical system events ■

High-Level Key Concepts

Anchors	Key Tasks and Description
	Identify Server Update rules for the following: ■ Updating Operating System patches ■ Updating non-Cadence tools such as anti virus software ■ Updating authentication server ■ Updating Licensing server ■ Updating SPB software version: ❑ DE-HDL or System Capture or System Capture + DE-HDL ❑ Release-independent support ■ Migrating across releases. For example, from release 17.4-2019 to release 22.1 ■ Updating PLM software version Determine external PLM server connectivity for the following: ■ PLM servers for Publish For Manufacturing: ❑ File System, available out of the box ❑ PTC Windchill, available out of the box ❑ Enovia 3DEXPERIENCE, available out of the box ❑ Agile Team Centre (through XPLM) ■ Determine the location of PLM and Pulse primary node for optimal performance ■ Configure the Pulse primary node to connect with PLM servers with authentication

High-Level Key Concepts

Anchors	Key Tasks and Description
	Identify the users to create and assign roles: ■ Special users – Admin, administrator, pulse ■ For LDAP, LDAPS, Azure AD – Search users from authentication database and assign roles to them

Maintenance Requirements for Non-SPB Software

Determining Cross-Release Support for Transition Between HotFix Releases

This section helps identify the cross-release support requirements between HotFix releases.

Cross-Release Support Requirements

Anchors	Key Tasks and Description
All users	Determine cross-release support for the transition period between HotFixes: For DE-HDL as a design authoring tool: ■ The primary node to be on the lowest version and the data nodes can be on any version which is equivalent or higher than the primary node. ■ Librarian should be on the same HotFix as the primary node ■ Designers can be on any version equivalent or higher than the data or primary node they connect to. ■ Allegro X EDM Flow Manager and Part Information Manager might require the `ADWCLIENT_CHECK_RELAX` variable to be set. For System Capture or DE-HDL as a design authoring tool: ■ The entire Pulse cluster must be on the same HotFix. ■ The librarian should be on the same HotFix as the Pulse primary node. ■ Designers can be on any version equivalent or lower or higher than the cluster.

Determining Recommended Flow for Transition Between Base Releases

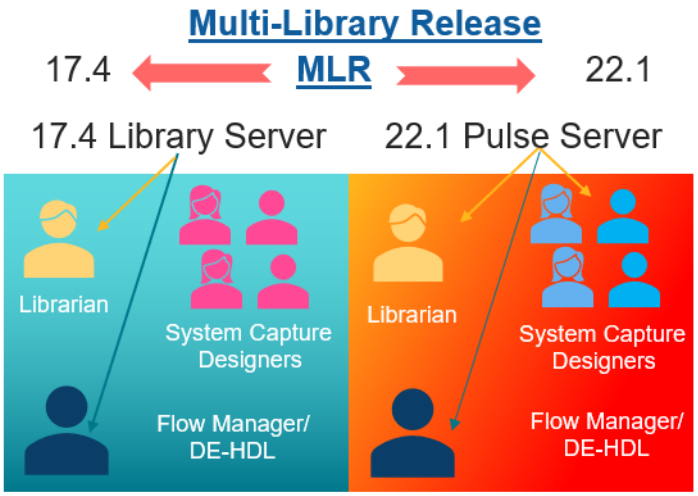
This section helps identify the recommended flow cross-release support requirements between base releases.

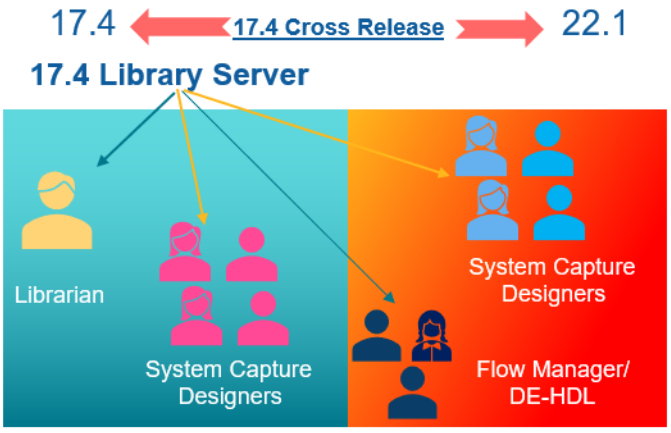
Recommendations for Transitioning Between Base Releases

Anchors	Key Tasks and Description
All users	Determine cross release support for transition between base releases. For DE-HDL as a design authoring tool: ■ Library/primary node to be on the lowest release and data nodes can be any version which is equivalent or higher than the primary node. ■ Librarian should be on same release as the primary node ■ Designers can be on any version equivalent or higher than the data / primary node they connect to. ■ Flow Manager and Part Information Manager might require the `ADWCLIENT_CHECK_RELAX` variable to be set.

Recommendations for Transitioning Between Base Releases

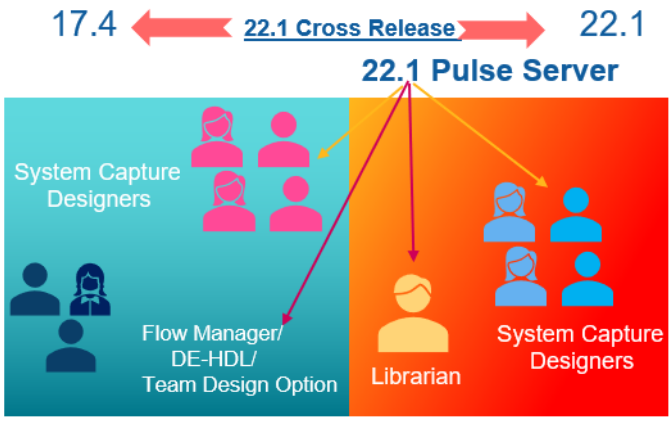
Anchors	Key Tasks and Description
	For System Capture as design authoring tool: Choose one of the following two approaches: ■ Update all client software first. For example, the Server is on 17.4 and clients moved to new release say, 22.1

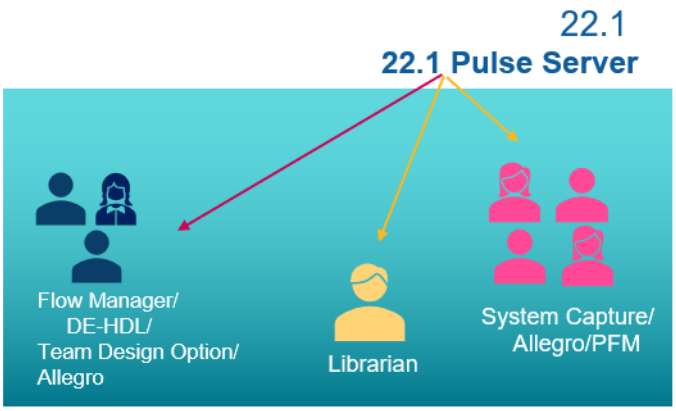




Recommendations for Transitioning Between Base Releases

Anchors	Key Tasks and Description
	■ Update the Server software first. For example, the Server is moved to 22.1 and clients remain on 17.4 and eventually move to new release 22.1.





Creating an Evaluation Checklist

This section helps identify how to evaluate the features to deploy.

Features to Evaluate

Anchors	Key Tasks and Description
EDA Admin and IT Admin	■ Evaluate all the features provided and choose the features you want to deploy on test server. ■ Exercise the flow and build methodology before going into production.

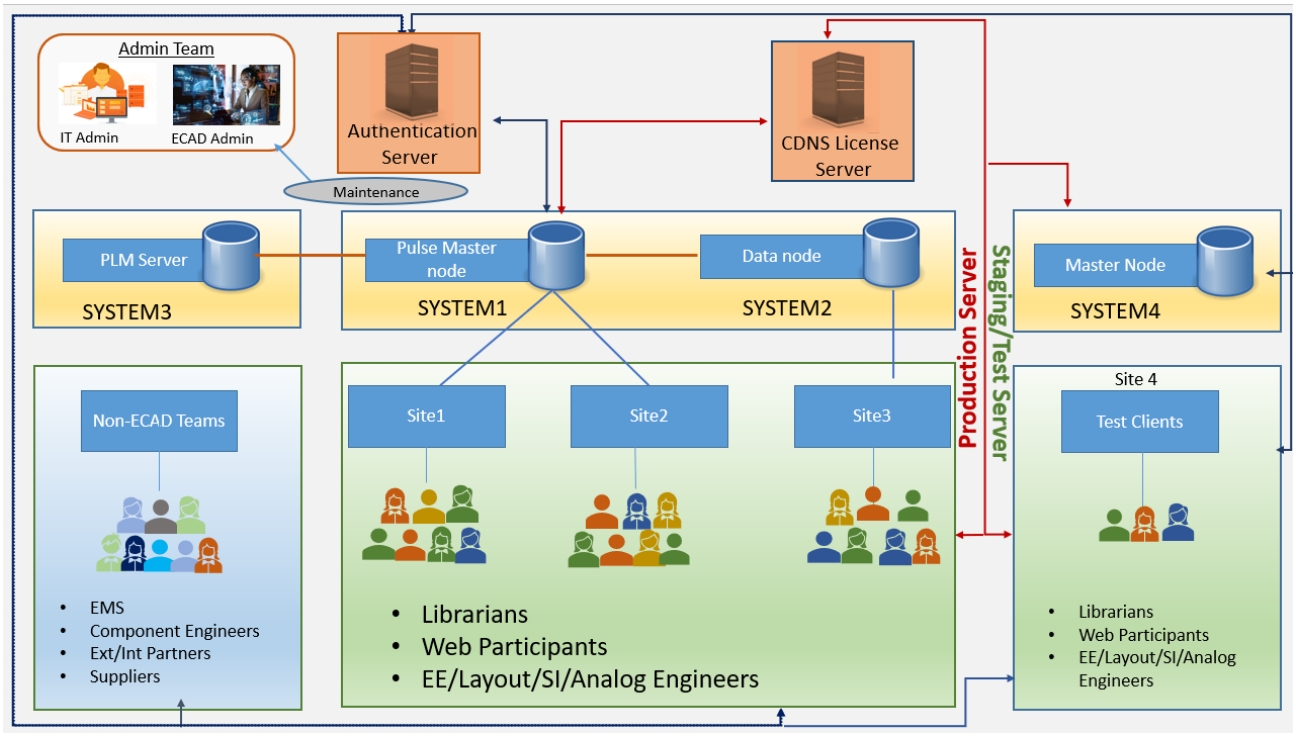
3

Pulse Deployment Environment

The information covered here helps you identify Pulse deployment configuration and server maintenance requirements for your organization.

Deployment Environment

The Pulse deployment environment includes a production and a staging or test server. A classic Pulse production server environment consists of a Pulse nodes cluster, which can include a primary node (server) and one or more data nodes (servers). A Product Lifecycle Management (PLM) server is also included optionally in the setup to publish ECAD content to a PLM system.



Evaluation of Production Server Requirements

The following points explain the production server requirements in a typical Pulse setup:

- Users connect to a primary node which stores and manages all the design and library data.
- In the enterprise environment, a cluster comprises a single primary node and can include multiple data nodes.
- A data node hosts a read-only version of the library data that is on the primary node.
- Any number of clients or sites can connect to the primary and data nodes.
- The primary and data nodes clients can include electrical engineers, layout designers, librarians and non-ECAD stakeholders (web participants).
- Integration with PLM Servers, such as PTC Windchill or Enovia 3DEXPERIENCE using an application called Publish for Manufacturing (PFM). See External PLM Server Connectivity for details.
- Roles, permissions, and ownership of designs and projects are defined on the primary node by the ECAD administrator.
- Each server, primary or secondary (data node), requires a Cadence license server to run.
- User authentication is required to allocate and identify roles and access permissions.
- Cadence authentication uses LDAP. Other authentication services, including LDAPS, SAML2, Azure AD, SSO, and OKTA integration are also supported in the Pulse enterprise environment.
- An IT administrator is responsible for the decisions on the type of authentication server and the location of the license server.
- An ECAD administrator, in collaboration with the IT administrator, is responsible for setting up a backup schedule to ensure data loss minimization in the event of a hardware failure.

Evaluation of Test or Staging Server Requirements

The Pulse primary node must be available all the time. It needs to be monitored continuously for a high uptime to stay live because the organization's data including libraries, designs, and the entire data resides on the primary node.

A test environment is highly recommended so that all of the following high-impact activities are carried out on the test server prior to deploying to production:

- Pulse software updates – New software patch adoption including testing new versions of software
- Exploring new Pulse features, which are not currently in production
- High risk *what if* analysis activities
- IT updates including OS patches

A test or staging server helps you save time and money, optimize performance, and prevent server downtime. It ensures that the expected product is delivered to production.

The following points explain the features of a staging server in the Pulse environment:

- It is a near-exact replica of the production server in terms of the architecture and configuration.
- It is a scaled down version of the primary node as you need just the single primary node instead of all the data nodes connecting to the production server.
- a staging server checks for the existence of licenses on your license server, but does not consume any licenses.

Supported Operating System and Platform Matrix

Pulse is supported on both the Windows and Linux operating systems.

For further details, refer to *Allegro X Platform System Requirements*.

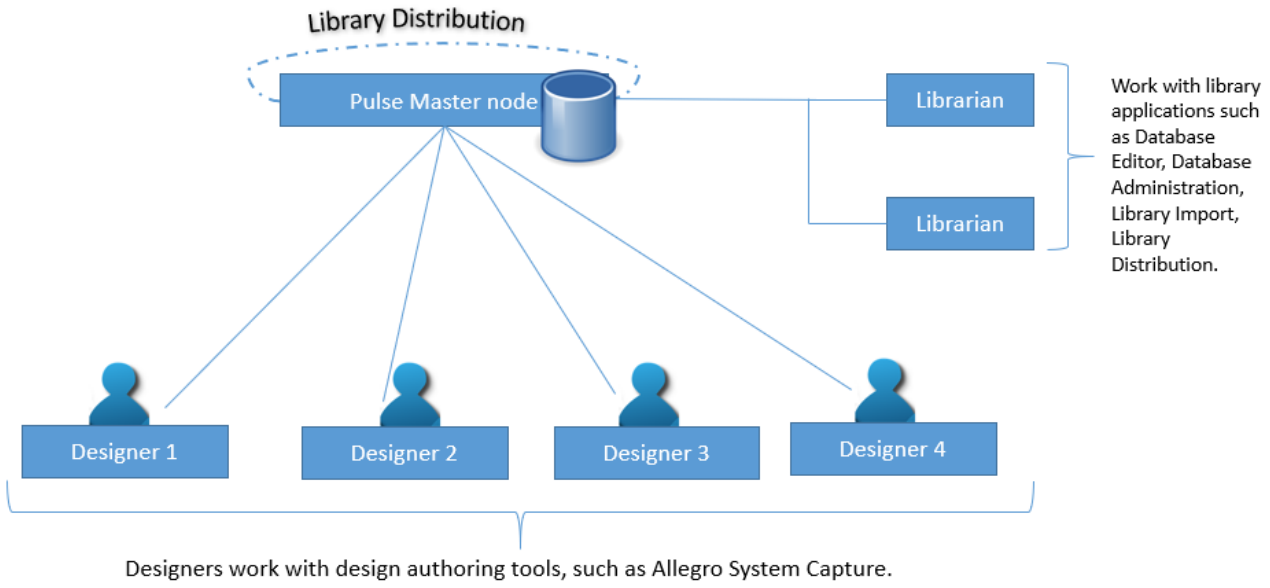
Server Configuration

Pulse deployment and cluster planning depends on a variety of factors including the size and structure of the organization, the cross-geographical distribution of its resources, network performance, the size of data being managed, and so on.

In a multi-user environment, the following deployment options can be implemented depending on the size of your organization:

- Single server deployment – For small organizations with most designers located in a single geography, a single Pulse primary node might be sufficient for storing both the libraries and the designs.

Single-Server Pulse Deployment Architecture for a Multi-User Environment



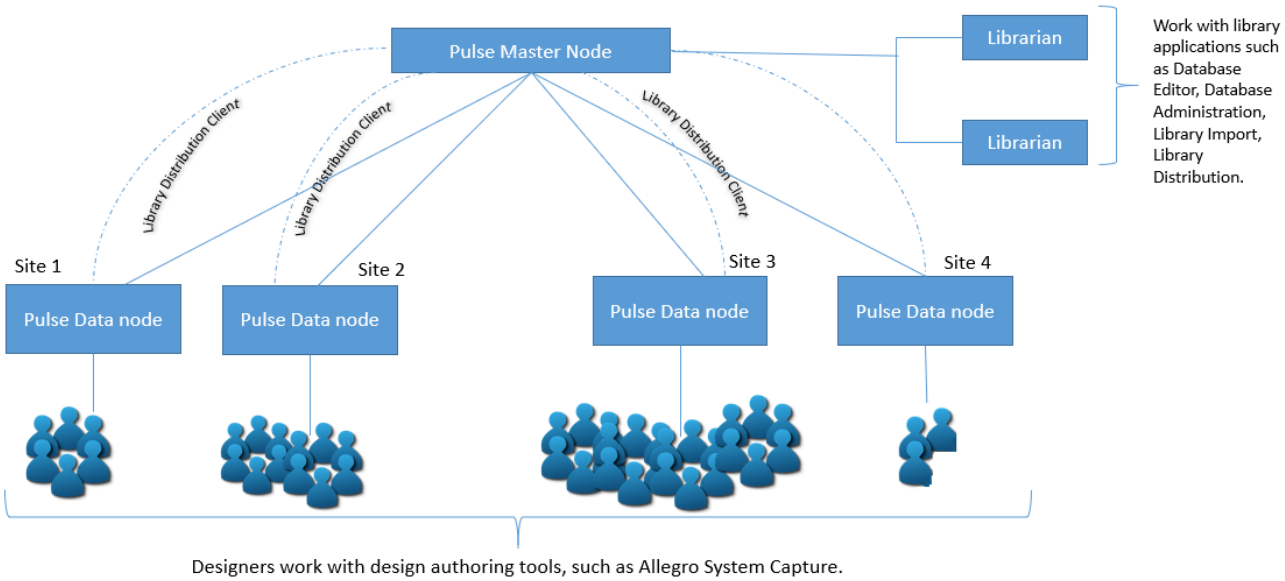
- Cluster of servers – For large organizations with multiple designers located in geographically dispersed sites, a cluster comprising a single primary node and multiple data nodes is the ideal choice of deployment.

  Accessing data directly from the primary node might be slow due to network latency with data nodes being away from the primary node. In such cases, local Pulse data nodes help improve the performance of some of the design tools.

  A data node hosts a read-only version of the library data that is on the primary node. This library data cannot be modified on the Pulse data nodes. When designers connect to a data node, design data travels from the client application to the data node, and then to

the primary node. Design versions for clients connected to a data node are stored on the primary node.

Pulse Cluster Option for a Multi-User Environment



Installing Pulse as a Service or Application

Installing Pulse as a service ensures that the Pulse primary node is started automatically when a system is restarted. Currently however, you need to run Pulse as an application if you are setting up the Pulse staging server. In this case, whenever the system restarts due to an IT activity, you must restart Pulse manually.

In both the cases, Pulse Service Manager starts up automatically when Pulse is started and provides an icon in the taskbar notification area for managing it though the Pulse Manager web page.

Static Server IP Address

The Pulse enterprise server must be available all the time as devices across the network need continuous access to the server. A static IP address is essential for a Pulse enterprise server so that external devices or websites remember the IP address and any lapse in user connections is avoided. A static IP address is also more stable for Internet use as it does not change.

Server Access Parameters Setup

Consider the following options while setting up the Pulse server:

- Host Access Through FQDN
- Network Security Through SSL

Host Access Through FQDN

Fully Qualified Domain Name (FQDN) represents the absolute address of the Internet presence. *Fully qualified* refers to the unique identification that guarantees that all the domain levels are specified. FQDN contains the host name and the domain, including the top-level domain, and can be uniquely assigned to an IP address.

An easy-to-remember URL such as the following is an example of FQDN:

`http(s)://<hostname>:<port_number>.global.cadence.com`

Network Security Through SSL

In the Pulse enterprise system, Secure Sockets Layer (SSL) ensures encrypted communication between the Pulse primary and data nodes or client machines. The Pulse server supports standard LDAPS (LDAP over SSL). To ensure encrypted communication between the Pulse primary and data nodes or client machines, you must create a Java KeyStore (JKS), which is a repository of security certificates.

Authentication and Authorization

- Authentication
- SSL Certificates
- Role Management

Authentication

Cadence authentication supports LDAP, LDAPS, SAML2, Azure AD, SSO, PingFederate, and OKTA integration in the Pulse enterprise environment.

SSL Certificates

The Pulse server can use SSL certificates to secure information transferred between two systems. If an SSL certificate expires, users cannot connect to the Pulse cluster. Renewal and replacement of an SSL certificate prior to expiration is a critical step in server maintenance. When a certificate is replaced in the OS trust store, the Pulse service on the host must also be restarted to reflect the updated certificate.

Role Management

Roles enable you to organize users based on various aspects, such as the division of the organization, the design team they are part of, or the tasks they perform. Roles streamline the sharing of Pulse server content and the configuration of other Pulse technologies. Some default roles supported by Pulse include *Administrator*, *Designer*, *Librarian*, and so on. You can either modify these roles or create new roles in Pulse.

The operations that default roles are eligible for are covered in Appendix: Roles in Pulse.

Server Location

Server location is the physical location of the Pulse server. Choosing a physical location for the Pulse server is crucial for optimal performance in terms of user login and authentication as well as processing speeds. Consider the following factors to determine the location of the Pulse primary node:

- Should be based on the number of users accessing the server from the site
- Should be based on the network speed and strength of the site
- Should be relative to the location of the Cadence application license and authentication servers

Capacity Planning

Pulse server capacity planning includes planning for the following:

- Compute Resources
- Storage Space

Compute Resources

Computing resources, such as computer hardware and software, servers, networks, and others are decided based on the current load and the scalability of the solution. While deciding, both scaling up and scaling out options should be considered.

Scaling up or vertical scalability involves adding additional resources to the system—upgrading a server or replacing it to handle the increase in the workload. It aims at adding more power to the current machines, such as adding more processing power by upgrading the existing hardware and software capacity by adding resources, such as CPUs, memory, storage, or network speed.

Scaling out or horizontal scalability involves adding additional nodes or machines to your infrastructure to meet the increasing demands.

Storage Space

Multiple factors influence storage space requirements of a Pulse cluster. A careful decision needs to be made on storage requirements based on the following factors:

- Number of users
- Average design or board size
- Expected number of saves per day on a design - this can be estimated by tracking and viewing the usage profiles in Athena. As use of the server ramps up, administrators can monitor user behavior and use the data to plan growth.
- Expected number of version on commits for a board
- Typical design or board cycle time
- Typical active and archived designs and boards at any given point of time in a year
- Library size – Number of parts, models, datasheets and their typical size
- Number of designs and boards per year

Similarly, the following storage parameters must also be considered for your organization as they influence data access, write data to disk—design versions, library model versions—storage capability, and scalability:

- Disk inputs and outputs operations per second (IOPS)
- Disk read and write latency
- Fault-tolerant storage medium

Network Parameters

The Pulse system has its own checks and balances for various network conditions. However, the following network parameters influence data transfer integrity between the clients and the server. Consider monitoring all these parameters for your organization as needed:

- Latency
- Bandwidth - Committed information rate (CIR)
- Packet loss
- Reliability - Mean time between failure (MTBF)
- TCPv4 Connection failure rate
- Availability or uptime of the server
- Network glitches
- Jitter
- Network congestion
- Timing drift

Disk Usage Management

You need to manage your disk space to ensure adequate storage space for the Pulse server. Disk usage monitoring helps you identify resource constraints early so that resource allocation adjustments can be made as required. Disk usage includes the aggregate disk usage of all the nodes—the disk space consumed by all the data in Pulse Home.

Allocation of Storage Space

Pulse does not have any disk quota limits. You can modify the disk quota as required. A cluster-wide disk quota can be configured to help an administrator maintain awareness of the aggregate consumption of all Pulse nodes in the cluster.

Setting up Log or Purge Clean-up Policy

Disk clean-up actions run the purge configuration on demand as opposed to waiting for a scheduled action to run. Disk clean-up can run the purge action on a single node or on all the nodes across the cluster. Configure the system such that Pulse purges data if the disk space falls below the default or specified disk quota.

To set up Pulse to purge data regularly to improve system performance, you can specify the purge settings for three types of data:

- Log Indexes
- Design Vault data
- Cluster Metrics

Pulse can be scheduled to purge data based on a Cron job. You can specify the purge schedule and the age of the data to be purged for temporary or log files.

Component Library Management in Allegro X Pulse

Pulse server supports two types of library management systems:

- EDM-managed library
- Indexed library for unmanaged libraries

EDM-managed library is the default option. It is based on the legacy *Allegro Managed Library* tools and flows, where components go through a defined process of library development and management, by CAD librarians, and distribution to the design teams.

Alternatively, if you use Allegro X System Capture primarily for design capture using either Design Entry HDL or Capture CIS libraries, you can work with libraries managed by your own set of utilities instead of Allegro X EDM. In the Pulse system, such libraries are referred to as *unmanaged* libraries. Pulse provides a mechanism to index unmanaged libraries for System Capture designers for better performance while accessing the libraries. System Capture can also work with local libraries.

Server Maintenance Activities

Maintenance activities for the server need to be scheduled to ensure seamless performance.

Data Backup for Disaster Recovery

Data backup and restore is a critical activity for data security and to prevent data loss. It is recommended that you back up your Pulse server data regularly. Backing up of data is a mechanism to implement a disaster recovery policy in Pulse. The following points should be considered when deciding the policy and frequency for Pulse database backup to handle any disorder condition:

- Decide on the frequency based on tolerance of data loss
- Backup time should be communicated to all users connected to the server
- It is recommended to back up data on the same hard disk for better performance, and then move it to a remote location to ensure that it is safe.
- The process of backing up sets the Pulse cluster into maintenance mode, which prevents users from accessing the Pulse server for a certain period of time. It is recommended that IT or ECAD administrators find a lean time to schedule the backup, to minimize impact on users.

The Pulse sever might sometimes be in the maintenance mode because of an internal error, which requires a server restart. An attempt at backing up data during this time flags an error message. Therefore, it is recommended to have some checks and balances to ensure that the backup is successful. Else, you are at risk of losing the data in case of a hardware failure.

Note: The restore process for various disaster cases—hard disk drive formatted, system replacement, or motherboard replacement— is different. When the hard disk drive is formatted or the system is replaced, some of the data which is not backed up might need to be configured.

For more information, refer to *Allegro X Pulse Maintenance Guide*.

Recommended Antivirus Scanning Policy and Exceptions

The Pulse server and client systems might have antivirus software installed by the IT team with the objective of preventing and addressing computer security threats and attacks.

Antivirus policies also scan data transferred by Pulse, which can impact data transfer performance in the Pulse system. For optimal performance, it is recommended that you exclude standard known files for virus scans, such as files in the standard Cadence software.

You must carefully evaluate and apply appropriate policies to secure the network from vulnerabilities.

Critical System Events Notifications

An important piece of server maintenance is enabling administrator notifications to apprise the administrator of critical issues noticed by the self-monitoring infrastructure of the server. Some of these include:

- Server going into the maintenance mode
- License server not available
- Users without specified roles

External PLM Server Connectivity

Publish for Manufacturing (PFM) provides integration with external Product Lifecycle Management (PLM) servers, such as PTC Windchill or Enovia 3DEXPERIENCE. This optional integration offers the following features:

- Ability to publish the following ECAD data to a PLM system for enabling ECAD-MCAD integration with non-ECAD team members, such as members of manufacturing services, component engineers, external partners, suppliers, and purchase departments for raising purchase orders and getting approvals through the PLM system:
  - Design data
  - BOM and or Variant BOM
  - Layout
  - Manufacturing outputs
- Publish for Manufacturing administration requires access to a running Pulse server to set up the data connection types.
- Data exchange is enabled between the Pulse primary node and the PLM server to ensure that the data owned by PLM systems is periodically updated and metadata for the library parts is updated in the Pulse server, so that accurate requirements, such as fr availability, cost, reach the designers.

- Data such as cost and RoHS- and Euro- compliance collected by a component engineer in the PLM system is communicated to the electrical engineer working in the Pulse environment to design the components at a given cost, per defined standards, and conforming to compliance directives.

PLMs Supported for Publish for Manufacturing

Organizations use various PLM systems based on their needs. The following PLM connection types are available in the Pulse system to configure a PFM data connection based on the licenses you have:

- File System
- PTC Windchill
- Enovia 3DEXPERIENCE
- Agile Through XPLM
- Team Center Through XPLM

File System

File System is a shared location within the organization's network. When using the File System mode for a connection, you can select any folder. All the users accessing a particular template publish to the same folder.

PTC Windchill

PTC Windchill is an enterprise PLM software that provides out-of-the box functionality that can be quickly implemented. When connecting to Windchill, you have the option to enable SSO.

You must specify the URL of the server that authenticates the secure delegated access of client applications, such as System Capture, to the connector, and the URL of the Pulse primary node (the Vista server). If you are not using SSO, specify your Windchill user name and password to connect.

Enovia 3DEXPERIENCE

PFM supports 3DEXPERIENCE from Dassault Systèmes as a PLM connector. For the 3DEXPERIENCE connector, you need to specify the passport and space URLs.

For more information, refer to *Publish for Manufacturing User Guide*.

Agile Through XPLM

PFM supports Agile through XPLM integration. This also requires configuring the Agile to PFM Admin setup.

Team Center Through XPLM

PFM supports Team Center through XPLM integration. This also requires configuring the Team Center to PFM Admin setup.

Identification of Physical Location of Server for Optimal Performance

The PLM and Pulse servers can be located at one of the following points:

- External connections – The location of the connector is the URL of the PLM system. Ensure that the Pulse server is as close as possible to the users for good network conditions, so that data transfer between the Pulse server and clients takes the minimum time and provides better performance.
- File system – This is the location where you can store all the objects to be released. For example, `c:/working_dir/Release_Management`. It is recommended to keep the location on the same system as the Pulse primary node. Because this location stores all the published data for all the users, ensure that you back up this folder along with Pulse backup.

Configuration of Pulse primary node to Connect with PLM Servers

The PFM application enables you to publish data to your PLM system for product manufacturing and enables you to create a Manufacturing Data Set that includes the ECAD Bill of Materials (BOM), and source and derived files through a structured template. You can configure the required outputs and the package structure per your release process.

Two sets of users work with PFM:

- Administrators who configure PFM - This user must be defined as an Administrator or Design Administrator in Pulse User Management. The configuration defined by the administrator resides on the Pulse server.
- Designers - Each user running PFM uses the administrator-defined configuration to publish data to the PLM system to maintain consistency.

PFM also provides designers with real-time version and life-cycle feedback for objects previously published to or residing in the PLM system including parts, schematics, boards, supporting documents, and so on.

Supported PLM Software Version

Ensure that the PLM versions are upgraded to be compatible with PFM. The following table lists the PLM Versions Support Matrix:

PLM Versions Support Matrix for Cadence Publish for Manufacturing

Windchill	Teamcenter	Agile
11.0 M030 (Minimum) 11.1 M020 11.2.x (Recommended)	11.4 (Minimum	9.3.5 (minimum)

Windchill Connector Considerations

Minimum Windchill REST Services (WRS) version requirements:

- WRS V1.5 minimum for Publish for Manufacturing features
- WRS V1.7 minimum for Library Sync Service

4

Pulse Memory and Roles

The information covered here helps you determine Pulse memory requirements and user roles and permissions.

Determining Memory Requirements

As the dataset managed in Pulse grows, an increase in the memory allocation to various services might be required. When a service experiences a memory event, Pulse automatically attempts to recover by restarting the service and minimizes the impact on users. An email notification is also sent to the administrators so that they can perform the corrective action required to prevent this condition from recurring.

There are two services that might warrant increasing the default memory allocation:

- Java Memory Settings for Library Management

  If the main Java Virtual Machine experiences an *Out-Of-Memory* error, the memory allocation can be adjusted in the Pulse Service Manager settings. The default allocation is `6 GB` but depending on the component database size this can be increased to `9 GB` or `12 GB`. This setting applies to all the Pulse data nodes as well. You can also contact Cadence for additional memory allocation guidance based on the usage profile and user capacity.

- Pantheon Memory setting - Pantheon is the Pulse Metadata Store. The default allocation is `2GB` but depending on the database size, this can be increased to `4 GB` or `6 GB`. Currently, setting the memory for this service is not supported through the user interface. You need to contact the Cadence support team for details on configuring Pantheon memory settings.

Determining Users and Roles

Roles help you organize users based on various aspects and control the permissions to use the functionality in a streamlined way. Roles and users are managed from Pulse *User Management Service* using the standard Keycloak service.

Configuring Pulse to use external databases, such as LDAP, LDAPS, and Azure AD, allows you to search for users from federate databases and assign roles to them. Alternatively, you can create users in the Pulse User Management module.

Default Roles in Pulse System

Pulse provides the following default roles, which you cannot modify:

- Administrator – Super user. Cadence does not recommend assigning this role to users in design authoring or library authoring roles.
- Design Administrator
- Designer - By default, the Designer role is assigned on creation of a user in the Pulse User Management module, or, if auto-creation is enabled, on a user's first login in to Pulse
- Librarian
- Library Administrator
- Pulse Managed Workflow
- Pulse Team Collaboration
- Pulse Web Participant
- Special users - Admin, administrator, pulse

To understand roles in detail, you must be familiar with the various features of Pulse. This will help you map roles with the Pulse features.

For details on roles in the Pulse enterprise system, refer to Appendix: Roles in Pulse.

5

Regular Synchronization Tasks

The information covered here helps you identify the regular sync-up tasks and their desired frequency.

Synchronization of Managed Library Data Across Sites

All managed library changes are submitted to the Pulse primary node. Synchronizing library data from the primary to data nodes and updating changes automatically is required to maintain data integrity. This is done through a process called *library distribution*.

It is recommended to schedule the frequency of data synchronization based on your requirements, such as once in `15 min` or `30 min`. When you schedule data synchronization, ensure sufficient buffer time between two consecutive runs to avoid any overlap.

Updating the ECAD Managed Library Data

In most organizations, component information is maintained in enterprise systems and the data related to cost and regulatory compliance is owned by the Component and Procurement engineers. It is important to pass that information to ECAD Design engineers so that they can choose the appropriate components while designing and ensure reduction in iterations of design cycles at the same time.

This can be achieved with *Data Exchange* where you map attributes from an external system with the EDM system and bring in the data. Similarly, the ECAD database contains the information including footprints, and such information can be synchronized with the enterprise resource planning or material requirements planning databases, if required.

Consider the following key recommendations:

- Ensure only the delta (change from the previous run) is updated in every run
- Based on the data size and the amount of changes, you can schedule this activity once a day or once a week

Synchronization of Part Data Between PTC Windchill and Pulse-Managed Libraries

Synchronization of managed library database with PLM-owned attributes, such as cost, regulatory compliances, manufacturer data, and so on is critical.

To synchronize Windchill-sourced data (PLM) with the Allegro X Pulse-managed library, you use the Library Synchronization service that leverages the Allegro X EDM Data Exchange function to update the Pulse-managed library. To use the Library Synchronization service, users with the `Administrator` role in Pulse User Management must first configure the service.

If the names of attributes in your PLM system and the Pulse-managed library differ, consider using the attribute mapping feature of Allegro X EDM Data Exchange before you synchronize data.

6

Evaluate Pulse Features to be Customized

The information covered here helps you evaluate:

- Optional Pulse features that can be enabled
- Pulse features that can be customized according to the organizational requirements

Evaluation of Optional Features

You can consider enabling the following optional features of Pulse based on your organization's requirements:

- New Part Request
- Multi Library Indexing
- Administrator Notifications
- Manufacturer Data Support

New Part Request

Enable this feature to let Allegro X System Capture designers submit part requests to librarians directly from the Unified Search part search interface in System Capture or from a web browser. Librarians can then accept or decline these requests.

Multi Library Indexing

The Pulse primary node enables hosting of unmanaged libraries and indexes them automatically. The primary sever facilitates enabling of EDM-managed libraries as well as indexing unmanaged libraries.

Administrator Notifications

Administrator notifications help administrators receive emails on critical server status to ensure that all maintenance requirements are immediately addressed.

Manufacturer Data Support

- Additional Objects Supported in EDM Library Database Using adwschema

Additional Objects Supported in EDM Library Database Using adwschema

To support features of Allegro X EDM that are not available out of the box, you use the `adwschema` utility to enable object types in the component database.

Some of the key considerations when using the `adwschema` utility are as follows:

- It enables:
  - object types, such as Manufacturer Part, Manufacturer, and Manufacturer Part Classification
  - the option to link a datasheet specification to a footprint
  - the Unicode character set support in Allegro X EDM
  - the extensions that facilitate import of existing Capture libraries, or the creation of new libraries, into and in Allegro X EDM
  - the extensions that facilitate reliability and reliability classification
- It is valid only if you enable the Manufacturer Part, Manufacturer, and Manufacturer Part Classification object types
- It ensures that Allegro X EDM Database Editor writes electrical part numbers in uppercase letters in the Allegro X EDM component database

The adwdbcheck Utility

Adwdbcheck is an administrator utility that you run in the EDM environment to check the integrity of the EDM library database. This utility checks the Allegro X EDM component database for invalid and erroneous library data. Such data can cause the database to become invalid or unusable. You need to check the report generated by this utility to identify and analyze all such errors to prevent any data loss or corruption.

Evaluation of Pulse-Specific Features

You can consider customizing any of the following Pulse-specific features to suit the organization's requirements:

- New Part Request Form Configuration
- In-Design Workflows Configuration
- Unified Search Configuration
- Live BOM Configuration
- Web Participant Project Creation Configuration

Note: Customizing any of these features requires the use of administrator credentials.

New Part Request Form Configuration

You can configure the option to submit new part requests, enabling designers to submit requests for components that are not in the company parts database to a dedicated library department or librarians within an organization. Librarians can use the Allegro X System Capture Part Request Dashboard or the Pulse web dashboard to submit new part requests.

As an administrator, you may want to customize the New Part Request (NPR) form for the following reasons:

- To name the attributes per the organization's standards
- To rearrange the fields in the user interface to your desired location
- To mark attributes as mandatory or read-only

Using the Pulse web dashboard, you can also hide the NPR form if your organization has its own request workflows for parts.

New Part Request Form Configuration

If you enable the part request process, Pulse provides a default *New Part Request* form that can be used to submit requests for new parts. The form contains fields for key information, such as the manufacturer and part number, a description for the part being requested, and any relevant datasheet (PDF or URL). For any additional organization-specific details, the ECAD or design administrators can customize this form to define the fields required on the form. You can only work with the fields provided by default. You cannot modify the database schema to add fields.

Because part numbers and their naming patterns are typically authored and decided in enterprise PLM systems, designers can submit a part request for a PLM-generated part number. This also ensures that multiple systems such as a PLM system and the ECAD library database are in sync with the new parts being requested by designers.

To use parts from external providers, such as SamacSys or Ultra Librarian in design projects, designers can submit a new part request for the same parts to be created in the PLM system and in the organization's central repository of parts.

In-Design Workflows Configuration

To ensure that a design team follows a consistent methodology to create their designs, Pulse provides centrally-managed, in-design workflows for Allegro X System Capture users. These workflows guide designers through the steps to bring a project from start to finish. As an administrator, you can customize workflows per the organization's requirements by editing and saving the default workflow. Workflows are under revision control in the Pulse database and each time you modify a workflow, Pulse stores a version of it.

Unified Search Configuration

You can configure Unified Search to customize it in the following ways:

- Visibility of various part properties in Unified Search – You can determine the properties to be displayed in the Summary column of Unified Search.
- Disable part content providers (SamacSys and Ultra Librarian) – To enable use of parts from `CDS_SITE` libraries, you can disable one or both the content providers, SamacSys and Ultra Librarian.
- Default search queries for all users - You can enable creation of search queries with wild cards or regular expressions in the Unified Search pane.
- Modify the Unified Search default rules.

Definition of Component Usage Standards for Unified Search

As an administrator or a component engineer, you might want to define standards and guidelines for part usage at the organization level. These parts may be based on parameters, such as reliability, availability, best deals based on vendor relations, design type, EoL date, and so on.

To improve efficiency, administrators or component engineers can define these parameters in a way that ensures that fewer parts appear in the unique BOM list across all projects or systems. This provides the following benefits:

- Fewer unique parts implies less interaction with various vendors
- Cost efficiency due to bulk purchases of parts
- Increases the probability of designers using recommended components, which improves efficiency due to correct part selection, and also shortens the design cycle.

You can also restrict the use of certain parts based on specified criteria by assigning appropriate actions and notes as required.

Live BOM Configuration

Live BOM provides access to real-time data, such as library properties and the part life cycle state. Parameters, such as quantity, comment, description, reference designator, footprint, and so on are displayed by default. You can configure the display of various parameters to analyze part usage quickly. For example, if you enable the display of tolerance, you can filter the Live BOM to view all resistors and their tolerance values.

Web Participant Project Creation Configuration

Web participants are users, such as component engineers, program managers, team managers, and so on, who can access Pulse only through a web browser. In addition to other tasks, they can create new projects from existing projects from the project details form in the Pulse web dashboard. You can modify the project ownership levels and define what can be uploaded and who has the permission to upload attachments.

7

Evaluation of PLM Feature-Level Configuration

The information covered here helps you evaluate the PLM features that can be configured per the requirements of the organization.

PLM Server Configuration

Publish for Manufacturing (PFM) simplifies the interaction between Cadence front-end applications and the PLM or Pulse platform by publishing the required design content to a PLM or Pulse server from within the ECAD tool. Prior to publishing design content to the PLM system, PFM needs to be configured. PFM configuration is a one-time activity, where the existing PLM product structure is configured to collect design data, create derived objects, and define what data to publish.

Configuration of Design Structure for Publishing and PLM Flow

PFM displays a hierarchical view of the ECAD assembly structure, including the relationships between the various objects. In the out-of-the-box configuration, PFM places the PCB assembly at the top of the product structure.

As an administrator, you can configure this structure because PLM systems tend to show these relationships differently. To configure and deploy Publish for Manufacturing, a strong understanding of the PLM structure and object relationships is helpful to correctly configure the *Publish* page.

The release structure in PFM defines the folder and file structure for the release package. As an administrator, you can modify the default PFM structure by:

- Adding an item to the release package (data set) you want to publish
- Modifying an existing name or changing the utility associated with the structure item
- Removing a structure item

PFM Templates

Publish for Manufacturing is shipped with two default templates for:

- Allegro X System Capture
- Design Entry HDL

The default templates contain details including the connector name and the PLM version for which it is valid, the user name and password for the connector, and so on. You can create custom templates and name them as required. Different PFM connector templates can also be used by different business units, all of which may be using the same PLM server.

For each template, you can then define the data to be published through a set of utilities that generate or locate:

- the file deliverables
- the PLM part attributes to be displayed in the BOM preview for schematic designers
- the publish structure that dictates the objects and relationships to be updated by PFM

All the templates are stored and versioned in the Pulse platform ensuring that all your changes are preserved.

Identification of Library Data to be Synchronized

To synchronize Windchill-sourced data (PLM) with the Allegro X Pulse-managed library, administrators use the Library Synchronization service that updates the Pulse-managed library. To use the Library Synchronization service, users with the Administrator role in Pulse User Management must first configure the service through a web-based interface called the ECAD Administration Portal.

Configuration of Library Synchronization with PLM System

You configure the Library Synchronization service and synchronize Windchill-sourced data with the Pulse-managed library in ECAD Administration Portal on the Pulse primary node (Vista).

If the names of attribute in your PLM system and the Pulse-managed library are different, consider mapping attributes between PLM system and Pulse-managed library using Data Exchange. If you leave the properties unmapped, your database will not reflect the updated values of the properties.

8

Data Verification

Verification of Data Post-Restore of Backup

When data backup is restored, an email notification is sent to the administrator and the cluster remains in the recovery mode until the administrator can verify that the restore was successful. An administrator can perform basic verification of data by reviewing:

- Design data: Run a spot check on the Pulse cluster to verify the Pulse design data using the Pulse web dashboard. From the web dashboard, verify whether library and design project data is available and whether version control is populated with PDF previews.
- Library data: Open Unified Search in the Pulse web dashboard and review search results for completeness. Ensure that configuration settings such as component selection rules are as expected.
- Workflows: Review in-design workflows in Allegro X System Capture. Submit a new part request and complete the workflow.
- Publish for Manufacturing: Run this application and ensure that the external data connection is working, and that the publish template contains the expected content.
- Users: Open the Pulse User Management console and ensure that all user definitions have been restored.
- Verify identity provider configurations. You can also view the Pulse User Management console to ensure that all user definitions have been restored.

Version Compatibility

When the restore process begins, the Pulse cluster transitions into the recovery mode and completes the restore process for each Pulse-managed service. The time taken to restore depends on the size of the checkpoint. To successfully restore a checkpoint, ensure that the Cadence base release or HotFix is the same or higher than the checkpoint. Any checkpoint generated by a lower base or HotFix release can be restored to a higher release.

For details, refer to *Restoring Allegro Pulse Service Manager* in the *Allegro X Pulse Maintenance Guide*.

Log Clean up and Purge Frequency

Data needs to be purged periodically to make more space on disk. You can schedule an automatic purge of specific data types on the Pulse nodes. Pulse Service Manager includes a purge scheduler that can assist in the disk storage maintenance process on each of the nodes in the Pulse cluster. The purge scheduler provides administrator control over three different datasets in Pulse:

- Log Indexes
- Design Vault
- Cluster Metrics

For details, refer to *Maintaining Allegro Pulse Service Manager Infrastructure* in the *Allegro X Pulse Maintenance Guide*.

Identify Server Update Rules

Server update tasks include the following:

- Updating Operating System (OS) patches - OS maintenance is a critical part of maintaining a robust, secure infrastructure for Pulse. OS maintenance should be scheduled during planned maintenance periods whenever possible and Pulse services should be shut down during the maintenance.
- Updating Non-Cadence tools such the Anti-Virus software
- Updating Authentication Server - LDAP and SSO Server. The admin credentials in Pulse should be changed periodically to ensure that only authorized users have access to the administration console.
- Updating Licensing Server - Cadence Licensing server version updates
- Updating Cadence Software Version - Keeping the Pulse infrastructure updated with the latest Hotfix from Cadence ensures increased reliability and stability for the following:
  - Design Entry HDL users
  - System Capture users
  - System Capture + Design Entry HDL users

- Release-Independent support

- Migrating across releases

Identify Server Maintenance Rules

Server maintenance tasks include the following:

- Server System Health Monitoring
  - Organization level IT Monitors - Help system administrators monitor IT infrastructure by monitoring system devices, traffic, and applications, and notifying in the event of any malfunctions or other disruptions. Host and storage infrastructure monitoring can identify resource constraints early and as a preventive measure, notify administrators of resource allocation adjustments as required. This includes:
    - primary data storage (disk volume)
    - Backup repository storage
    - OS installation volume
    - CPU usage peaks and average consumption
    - Memory capacity during peaks and average consumption
    - Network interface bandwidth
    - TLS Certificate expiration
  - Out-of-the-Box Pulse Monitoring
    - Pulse Manager displays the location of various machines on a map to help you track and locate them easily.

- Network Health Monitoring

  Pulse provides self-monitoring features that can notify administrators of the issues detected. External monitoring is an important aspect of maintaining the infrastructure and addressing issues which arise. Pulse provides a health monitoring `HTTP` endpoint which can be integrated with many third-party remote monitoring solutions. The health endpoint returns an `HTTP` status for each Pulse node. It can be accessed using the following URL:

  ```
  http(s)://<ACCESS URL>/api/v1/element/health
  ```

  This endpoint returns an `HTTP 200` status code when the server is running nominally and an error (`5XX`) when an error condition is present.

A

Appendix: Roles in Pulse

The information covered here helps you determine the roles in the Pulse system.

Roles and Operations

The operations that default roles are eligible for are listed in the following table.

Role	Eligible Operations
Administrator	Part Request Designer Operations
	Part Request Administration Operations
	Pulse Manager (browser page) Designer Operations
	Publish for Manufacturing Administration Operations
	Publish for Manufacturing Designer Operations
Librarian	Part Request Designer Operations
	Part Request Librarian Operations
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Designer Operations
Library Administrator	Part Request Designer Operations
	Part Request Librarian
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Designer Operations
Designer	Part Request Designer Operations
	Pulse Manager (browser page) Designer Operation

	Publish for Manufacturing Designer Operations
Design Integrator	Pulse Manager (browser page) Designer Operation
Design Administrator	Part Request Designer Operations
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Administration Operations
	Publish for Manufacturing Designer Operations
Special Users	
admin	Pulse Manager (browser page) primary or data node setup Password: admin
	User Management
administrator	Password: pwd
pulse	Operation system-level local user, which is auto-created as part of the Pulse service installation on Linux Dummy user without password

Roles and Features

The following table lists the Pulse features and the possible roles that use these features:

Feature	Role and Possible Tasks
Pulse Manager (browser page)	**Designers**: Change Pulse Home, Set Remote Server
	Administrators of primary or data nodes: Set up primary or data nodes, Pulse cluster management and monitoring, pulse user management configuration
Part Requests	**Designers**: Create/Edit/cancel Part Requests, Assign Part Requests, Subscribe/Unsubscribe to Email Notifications, Put on Hold, Free From Hold

	Librarians: Create Parts, Release Parts, Ask for Information, Put on Hold, Free From Hold
	Administrators: Edit and Publish Part Request Form, Put on Hold, Free From Hold
Publish for Manufacturing	**Designers**: Open Project, Generate Content, BOM Generation, BOM Sync, Publish Content
	Administrators and Design Administrators: Configure Publish for Manufacturing (Generate Content Utility Creation, Configuring BOM Attributes, Configure Publish Dialog, Set Mandatory and Non-Mandatory Rules)
Version Management and Design Sharing	**Designers**: Save Designs to Vault with Version on Save, View Version Graph, Share Designs, Check In/check Out Design Sub-Objects (including derived data objects such as PDF and Live BOM), Update Designs With Latest Library Changes
	Design owners (design authors): Share Designs With Other Designers, Release Lock
Unified Search/Live BOM	**Designers**: Search Parts From Cadence-supplied or Custom Libraries/Ultra Librarian/SamacSys to Add/Replace/ Modify Parts in Designs **Administrators**: Map Properties and define available properties
Unified Search	**Administrators and Library Administrators**: Enable or disable data sources, define attribute aliases
Live BOM	**Administrators**: Enable or disable data sources, define attribute aliases
In-Design Workflow	**Administrators**: Edit or create in-design workflows, publish data
	Designers: View and adhere to in-design workflow
Allegro Library Manager (Allegro X EDM)	**Librarians**: Library object creation/modification/verification/ release/library distribution, managing working sets
	Library Administrators: Classifications Management, PPL Management/Lifecycle/User/Library Management, Flow Configuration

Role	Eligible operations
Administrator	Part Request Designer Operations
	Part Request Administration Operations
	Pulse Manager (browser page) Designer Operations
	Publish for Manufacturing Administration Operations
	Publish for Manufacturing Designer Operations
Librarian	Part Request Designer Operations
	Part Request Librarian Operations
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Designer Operations
Library Administrator	Part Request Designer Operations
	Part Request Librarian
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Designer Operations
Designer	Part Request Designer Operations
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Designer Operations
Design Integrator	Pulse Manager (browser page) Designer Operation
Design Administrator	Part Request Designer Operations
	Pulse Manager (browser page) Designer Operation
	Publish for Manufacturing Administration Operations
	Publish for Manufacturing Designer Operations
Roles: offline_access	Not to be modified
Roles: uma_authorization	Not to be modified
Special Users	
admin	Pulse Manager (browser page) primary/Data Node Setup
	User Management

administrator	
pulse	OS-level local user. Auto-created as part of Service installation on Linux

B

Appendix: Cadence Tools and Technologies

This section lists the tools and technologies ECAD and Non-ECAD users need to familiarize with to work in the Pulse environment. Use this as an analysis checklist prior to deployment.

This section provides information on Cadence functions and tools supporting the following technology domains:

- Library Data Management and Collaboration
- Logic Design Authoring
- Physical Board Authoring
- Logical Design Data Management and Collaboration
- Physical Board Data Management
- Logical to Physical Data Management and Collaboration
- Designer and Librarian Collaboration
- Publish for Manufacturing (PFM)
- Web Participants (including non-ECAD/EDA Engineers
- Pulse Enterprise Platform
- ECAD Admin Utilities
- IT Admin Utilities

Library Data Management and Collaboration

Functionality	Pulse Feature/Tool
■ Design Capture – DE-HDL	
■ PCB Layout (Allegro X layout editors)	Allegro X EDM Database Editor, Allegro X EDM Database Administrator
■ Datasheet	
■ Custom Models	
■ Parts	
■ Mechanical Objects	
■ Blocks	
■ Modules	
■ Classification Management	
OrCAD Libraries and CIS DB	
Multi-Site Library Distribution	Library Distribution
Enrich library data from PLM/ERP/MPR data bases for Cost, Compliance, Availability, and so on.	Data Exchange
Global easy searchability	
Library verification for data integrity and flow usage	
Pre-Release	
Customizable Library Flows	Flow Manager
Library Reports	Report Generator
Life Cycle Management	Third Party - PTC Windchill, Enovia 3 DX
Preferred Part List Management	
Multiple Library Release (MLR)	
Multi Edit	

Logic Design Authoring

Functionality	Pulse Feature/Tools
Search and place from latest released/pre-released library data	Unified Search
Update existing design with Latest released/pre-released library data	Part Manager
Live Bill of Materials with Mechanical Object Support	LiveBOM
Place part from content providers –SamacSys, Ultra-Librarian, Silicon Expert	Unified Search
In-Design workflows	

Physical Board Authoring

Functionality	Pulse Feature/Tools
Use latest released/pre-released library data to build board.	
Update existing design with Latest released/pre-released library data	Symbol Revision Manager (SRM)

Logical Design Data Management and Collaboration

Functionality	Pulse Feature/Tools
Version on Save	
Version on Commit	
Derived data (PDF) Creation	
Version Tree	
Adhoc Team design	
Structured Team Design - Block Level Support	
Structured Team Design - Page Level Support	

Physical Board Data Management

Functionality	Pulse Feature/Tools
Version on Commit	
Version Tree	

Logical to Physical Data Management and Collaboration

Functionality	Pulse Feature/Tools
Linking Schematic to Board	

Logical to Physical Data Management and Collaboration

Functionality	Pulse Feature/Tools
In Design Schematic and PCB Update notifications	
Import from Pulse	

Designer and Librarian Collaboration

Functionality	Pulse Feature/Tools
New Part Request (NPR) with Datasheet support	
NPR Form Customization	
Local Library Support	

Publish for Manufacturing (PFM)

Functionality	Pulse Feature/Tools
FileSys: Publish	
Publish Structure Customizations specific to PLM	

Publish for Manufacturing (PFM)

Functionality	Pulse Feature/Tools
PTC Windchill: Publish (Logical Design, Physical Board, BoM, Variant BoM, Custom Objects)	
PTC Windchill: Library Synchronization	
Dassault's 3DX: Publish (Logical Design, Physical Board, Bill of Materials, Variant BoM, Custom Objects)	
Dassault's 3DX: Library Synchronization	
Dassault's 3DX: Pull PLM Part Number	

Web Participants (including non-ECAD/EDA Engineers

Functionality	Pulse Feature/Tools
Design Project List	
Design Metadata Configuration	
Search Parts from Latest Release/Pre-release libraries with Symbol and Footprint Viewer	

Web Participants (including non-ECAD/EDA Engineers

Functionality	Pulse Feature/Tools
Part Request Creation, Assignment, Take it to flow	
Project Details: Metadata Details, Schematic Version Graph and Derived data view, Project Team Assignment	
New Project Creation: From Template	
Attachment(s) Support to an existing Project	

Pulse Enterprise Platform

Functionality	Pulse Feature/Tools
Pulse primary node setup as Service	
Server Monitoring - Computing resource usage, Network resource usage, and so on	
Authentication and Authorization Management (LDAP/ LDAPS/SSO/Azure AD/ SAML2)	
Roles and Permissions Management	

Pulse Enterprise Platform

Functionality	Pulse Feature/Tools
Debug log generator	
Backup and Restore of Database	
Disk Storage Management	
Server and Client Maintenance (Start/ Stop)	
Log Management	
Health Monitors	
Auto Emailer Setup	
Pulse and Temp file management	
License / Active User management	

ECAD Admin Utilities

Functionality	Pulse Feature/Tools

IT Admin Utilities

Functionality	Pulse Feature/Tools

C

Appendix: Third-Party Applications Used in Pulse

The information covered here helps you identify the third-party software and services for the following functions:

- Search
- Storage
- Authentication
- Database management
- Analytics
- Monitoring
- Data logging
- Metrics
- Workflow

Several core services of Pulse leverage open-source technology packages which have integrations available. Some of these third-party applications are listed in the following table:

Third-Party Application Stack Used in Pulse

Application	Function	Pulse Service
ElasticSearch	Search	Beehive

Third-Party Application Stack Used in Pulse

Application	Function	Pulse Service
Apache Hadoop Distributed File System (HDFS)	Storage	Hydra and Hydra Master
Apache Cassandra	Database management	Pantheon
Kibana	Works in combination with ElasticSearch	Athena
Filebeat	Shipper for forwarding and centralizing log data	Shipper
Metricbeat	Collects metrics from the operating system and from services running on the server. Works in combination with ElasticSearch	Boson
Keycloak	Identity and Access Management	Salus
Flowable	Workflow	Workflow-rest and Modeler
Hazelcast	Distributed cache	Iris
Jetty	Web server	Jetty