

Load Balancer Requirements and Configuration Guide

PowerSchool 12.x
Student Information System

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This edition applies to Release 12.x of the PowerSchool software and to all subsequent releases and modifications until otherwise indicated in new editions or updates.

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Introduction

A load balancer, also referred to as an application delivery controller appliance, is required for PowerSchool Server Array deployments consisting of two or more Tomcat application node servers. A properly configured load balancer will appropriately distribute incoming user traffic to the multiple Tomcat application node servers, allowing for optimized performance and scalability. Additionally, the load balancer can provide the ability to offload the SSL/TLS transactions, as well as serve cached PowerSchool content, negating the need for a separate PowerSchool Image server. Although neither supported nor certified by PowerSchool, any load balancer appliance, when configured properly, should have the potential to operate successfully within the production environment. PowerSchool does not endorse any manufacturer. The specific load balancer manufacturer provides product support for the configuration of the load balancer appliance. Cisco, F5, and KEMP Technologies appliances (among others) should all meet the load balancing requirements for PowerSchool.

The purpose of this document is to provide PowerSchool customers with an understanding of the load balancing requirements specific to the PowerSchool application. This document discusses configuration settings for implementing PowerSchool within a load-balanced environment. This information is required to ensure system usability and a quality user experience. The document does not provide step-by-step instructions on how to install or configure the individual load balancer. For information on how to install and configure various load balancer solutions, consult the manufacture's user guides.

PowerSchool provides application support for PowerSchool when it is deployed in a load balanced environment. However, PowerSchool does not provide direct support for the configuration and performance of the load balancer itself within the definition of PowerSchool Technical Support.

PowerSchool does offer customers consulting services to integrate and support various load balancing solutions. Contact your PowerSchool account executive or email TSGHelpDesk@powerschool.com for further details.

Important Notes:

- This document is intended for system administrators. To use this document, you must be familiar with load balancing technologies and network protocols.
- This document is designed to assist customers with configuration settings for load-balanced PowerSchool environments.
- Load balancing technology is not specific to PowerSchool. Any load balancer solution that is capable of handling Layer 7 load balancing, cookie-based persistence, and SSL/TLS processing should have the potential to operate successfully within the PowerSchool environment.

- While SSL/TLS processing or offload features of the load balancer are recommended for SSL/TLS implementations, it is not required to be processed by the load balancer and can be configured as pass through with SSL/TLS terminated on PowerSchool application servers.
- For important information about configuring SSL for PowerSchool 11.0.1.0 or greater, see [Knowledgebase article 72483](#).

Network Topology

The load balancer is a multi-homed device with two or more network ports. Network Address Translation (NAT) is utilized to translate all requests from the external virtual server(s) or virtual service(s) to the internal real servers. The external virtual server(s) or virtual service(s) can be referred to as the single TCP/IP address that will be listening for incoming requests based upon the TCP port. Your DNS records for the PowerSchool domain names should correspond to these virtual server or virtual service TCP/IP addresses. It is common to have multiple virtual server(s) or virtual service(s) based upon your PowerSchool deployment. Incoming traffic to the virtual server(s) or virtual service(s) will then be directed to the internal real servers, which are the actual PowerSchool servers.

Layer 7 Network Transparency is utilized with PowerSchool load balanced environments. Network Transparency provides the ability to preserve the client's source IP address and present it to the PowerSchool application server(s). This is required if you intend to use PowerSchool security features that disable the PowerSchool user account caused by failed logon attempts. The PowerSchool security features not only disable the PowerSchool account, but also the client's source IP address.

The load balancer must be configured in a two-arm configuration, and the following criteria must be met to implement Network Transparency successfully:

1. PowerSchool Servers must be configured on a **unique subnet** that differs from any subnet that is used by internal clients to access the PowerSchool application that is handled by the Load Balancer appliance.
2. The PowerSchool Servers configured on the **unique subnet** must be configured with the **TCP/IP default gateway** of the PowerSchool Servers to point the TCP/IP address that is bound to the *Server Side Interface* of the load balancer.
3. The **unique subnet** used for the PowerSchool Servers should have only one default gateway on the **unique subnet** that would be the TCP/IP address that is bound to the *Server Side Interface* of the load balancer.
4. The PowerSchool Servers must be configured on this same, **unique subnet**, including the PowerSchool Database server.

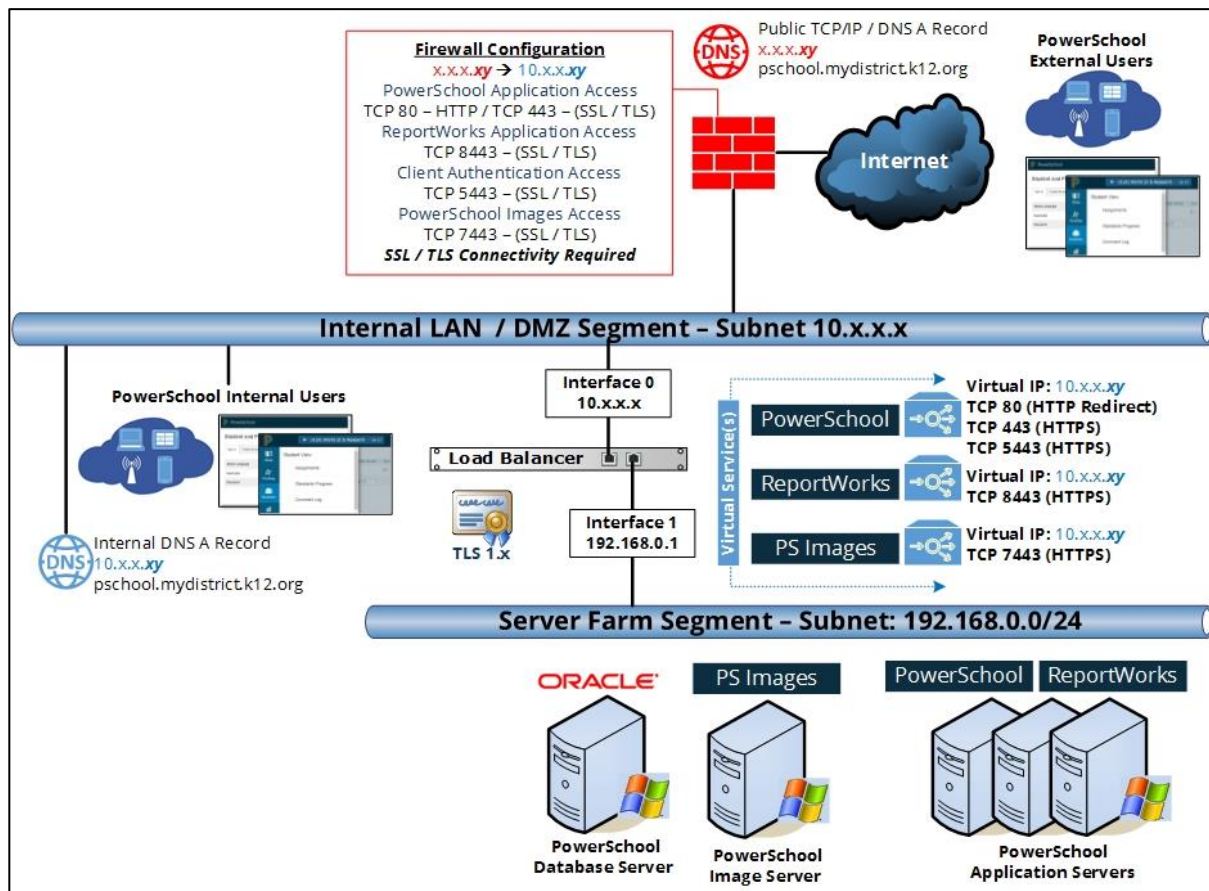
Since the load balancer is a multihomed device, there are several configurations available to support the incoming requests to the external virtual server(s) or virtual service(s) based upon your network topology requirements. While your individual deployments may vary based upon your district security policies, the two examples listed below are the most common configurations used with PowerSchool load balanced environments.

Configuration

Configuration Example 1

Interface **0** Port → External **Virtual Service(s)** configured on Internal LAN/DMZ Segment – Subnet 10.x.x.x for incoming requests from internal and external clients.

Interface **1** Port → PowerSchool server(s) configured on Server Farm Segment – Subnet: 192.168.0.0/24 to accept directed traffic from **Virtual Service(s)**.



Each corresponding **Virtual Service** will then distribute traffic to the actual PowerSchool server(s) on the 192.168.0.0/24 network. If configuring SSL/TLS termination on the load balancer, the PowerSchool server(s) will accept incoming traffic from the load balancer on native non-secured ports.

- **PowerSchool: TCP Port 80**
- **ReportWorks: TCP Port 7980**
- **PowerSchool Images: TCP Port 8080**

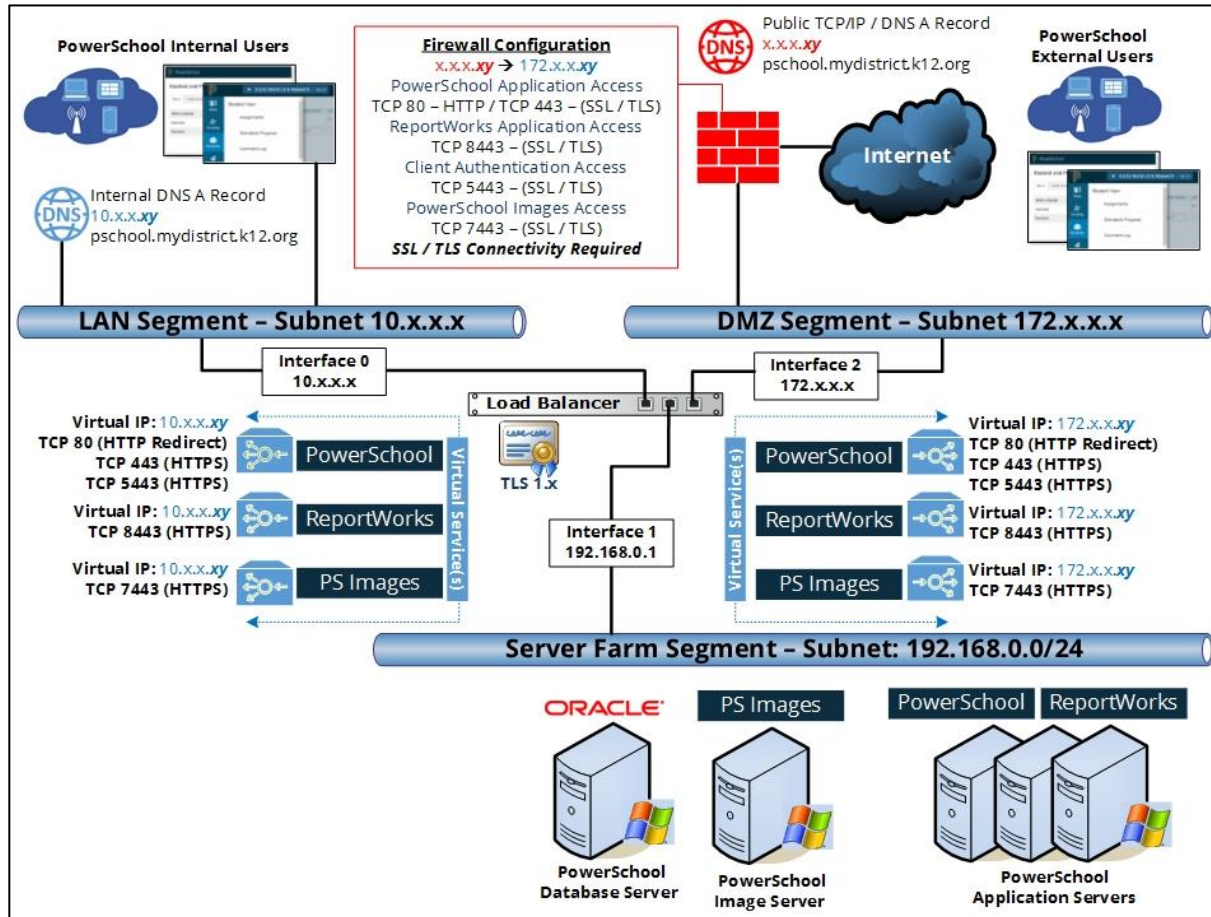
The Default gateway for PowerSchool server(s) is 192.168.0.1 (Load Balancer Interface 1 TCP/IP address) to ensure proper routing back to the client.

Configuration Example 2

Interface **0** Port → Internal **Virtual Service(s)** configured on LAN Segment – Subnet 10.x.x.x for incoming requests from internal clients.

Interface **2** Port → External **Virtual Service(s)** configured on DMZ Segment – Subnet 172.x.x.x for incoming requests from external clients.

Interface **1** Port → PowerSchool server(s) configured on Server Farm Segment – Subnet: 192.168.0.0/24 to accept directed traffic from **Virtual Service(s)**.



Each corresponding **Virtual Service** will then distribute traffic to the actual PowerSchool server(s) on the 192.168.0.0/24 network. If configuring SSL/TLS termination on the load balancer, the PowerSchool server(s) will accept incoming traffic from the load balancer on native non-secured ports.

- **PowerSchool: TCP Port 80**
- **ReportWorks: TCP Port 7980**
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The Default gateway for PowerSchool server(s) is 192.168.0.1 (Load Balancer Interface 1 TCP/IP address) to ensure proper routing back

Load Balancer Settings

There are common settings for each load balancer configuration that must be configured and enabled for PowerSchool functionality. While configuring the load balancer will vary based upon the manufacturer, the principals and fundamentals can be applied to any load balancer that is capable of handling Layer 7 load balancing, cookie-based persistence, and SSL/TLS processing.

Layer 7 Load Balancing

Layer 7 is part of the OSI model called the application layer. Application protocols at this layer are typically HTTP and HTTPS. The PowerSchool Tomcat application node servers require that the external virtual server or virtual service be configured with Layer 7 or L7. "Round Robin" is the most commonly used with PowerSchool deployments, which distributes connections evenly across all available real servers in a sequential order. Performance tests have been conducted with the "Least Connection" option, which monitors traffic and distributes the load more evenly. Depending on your district's usage patterns, you may discover that yet another method of handling the user traffic is preferable. The different options available for distributing the load are dependent on the model of load balancer in use.

The load balancer will check connections to the real servers to determine if they are on the network and able to receive the directed traffic. This is commonly referred to as the Health Check. PowerSchool recommends setting the Health Check to utilize HTTP/1.1 on a HTTP port to ensure the real server can serve web requests.

Cookie-Based Session Persistence

Cookie-based session persistence is used with load balanced PowerSchool environments. The *session* is stored on the server and manages the server side of client/server communications. The *cookie* stores bits of data on the client (browser) and are passed to the server via the HTTP header cookie. They can contain session information, for example to indicate a server with which the client has already established an authenticated session. The process of ensuring that a user is connected to the same server every time they make a request within the boundaries of a single session is called *persistence*. When configuring Persistence options, PowerSchool utilizes an Active Cookie. The timeout value for the Active Cookie will vary based upon individual district security policies. Common timeout values used typically correlate with your inactive timeout settings within PowerSchool. Once an Active Cookie has expired the client will be issued a new Active Cookie. The Active Cookie does not expire during an active session. The Active Cookie name is not specific to PowerSchool. Common Active Cookie names used are typically associated with application for which they are being used. An Active Cookie name commonly used with PowerSchool can simply be labeled PowerSchoolCookie.

SSL/TLS Offload

SSL/TLS offloading capabilities provide the ability for the load balancer to encrypt and/or decrypt traffic sent via SSL/TLS. Incoming SSL/TLS traffic (HTTPS) sent to the load balancer Virtual Service(s) processes the SSL/TLS encryption and directs traffic to the internal real servers on their native non-secured ports. This increases performance of SSL/TLS implementations by not having any of the server resources process the encrypting and/or decrypting of SSL/TLS. When purchasing TLS certificates for use on the load balancer remember that the Certificate will be placed on the load balancer and not the PowerSchool server(s). Within the PowerSchool application network settings, the load balancer will be configured as a proxy. Refer to your load balancer documentation for specifics on the type of certificate to use on the load balancer.

Important Note: PowerSchool 12.0 requires TLS in all production and test environments.

Appendix A – PowerSchool and Load Balanced Environments

This guide outlines the PowerSchool load balancer parameters known to be conducive with very specific large-scale implementations of PowerSchool.

While PowerSchool does not test and collect data for all load balancer solutions, we do believe that our application lends itself well to any type of load balancer solution.

A note on technical support for PowerSchool in a load balanced environment:

PowerSchool provides application support for PowerSchool when it has been deployed within a load balancer environment. However, PowerSchool does not provide direct support for the configuration and performance of the load balancer itself within the definition of PowerSchool Technical Support.

What does this mean?

If PowerSchool Support, through the course of a technical support interaction, suspects an application, performance, or stability issue related to inadequate load balancer resources or load balancer configuration, it would be the responsibility of the district server administrator to address these issues. If the cause of such an issue cannot otherwise be identified, it may ultimately become necessary to isolate the PowerSchool installation to a non-load balanced environment, removing the load balancer from the environment, to rule out any load balancer-induced issues. If this becomes necessary, the customer will assume any and all responsibilities and/or costs associated with the redeployment of PowerSchool and its associated resources.

While PowerSchool requires the use of its PowerSchool product in conjunction with a load balancer for Server Array deployments, PowerSchool assumes customer subject matter knowledge of, as well as ownership and responsibility for, the load balancer solution on which it has been deployed.