



PNMsoft Knowledge Base

Sequence Best Practices

**Topologies for Sequence**

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## General Document Information

### Purpose

The purpose of this document is to describe recommended topologies for Sequence installations.

### Prerequisites

This document is intended for IT systems professionals, such as Enterprise Architects and Systems Integrators.

### Document Legend

#### Legend for database icons



Single database server



Two redundant database servers

## Topology Design Principles

### Overview

Sequence can be deployed on a single server for evaluation or development, or on many servers. Sequence's three-tier roles include:

- Web server role — Fast, light-weight server which responds to user requests for the Flowtime web pages. All web servers in a cluster are mirrors of each other and are load balanced.
- Application server role — Provides the service features of Sequence. An application server often hosts the administration site, the Background Runtime service and the AD Synchronization Service. Multiple redundant application servers can be load balanced.
- Database server role — Stores processes definition and data. The database can be clustered or mirrored for failover protection.

In a small environments, server roles can be combined on one or two servers. For example, web server and application server roles can be combined on a single server or on two or more servers to achieve redundancy.

This document also includes infrastructure design guidelines for Sequence Mobile Application (Process <sup>TO</sup> GO).

### Sequence Windows Services

The *Background Runtime Service* has unique load-balancing technology which makes every instance aware of the rest of the services. This service executes the following functions:

- Email sending
- Asynchronous Workflow Execution
- Statistics Calculation
- Instance Archiving

The AD Synchronization service can be installed in failover mode to achieve redundancy. This service executes the User synchronization from the Organizational Active Directory.

### Virtual Topologies

This model provides examples of virtualized topologies. Virtualized topologies depend on the capacity of physical hosts, desired ratio of virtual machines to hosts, and the underlying virtualization technology.

## Server Roles



### Web server

- Hosts Flowtime Site, Web services, and Web Parts that are necessary to process business processes.



### Application server roles

Hosts the Windows Services and Administration site

- In many farms, all services will run on two identically configured application servers for redundancy.



### Database server

The Sequence database has 3 different file groups:  
Primary, Attachments and Archived Instances

## Legend

Please note the meaning of the following terms used in this document:

**Users** = users in the Database (not concurrent).

**Instances** = open and close instances in the Database.

## Topology Concepts for Sequence

### Smallest fault-tolerant farm

The smallest fully redundant physical farm incorporates six servers — two for each tier. User requests are automatically load-balanced across the web servers and application servers are utilized equally.

Use SQL Server clustering, mirroring, or AlwaysOn for the database servers. AlwaysOn requires SQL Server 2012.

Web servers



Application servers  
running windows  
services and host the  
administration site



Database Server



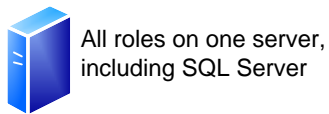
## Example Topologies

### Limited Deployments

Limited deployments are typically used for product evaluation, development and testing, or for environments that have limited numbers of users and don't require fault-tolerance.

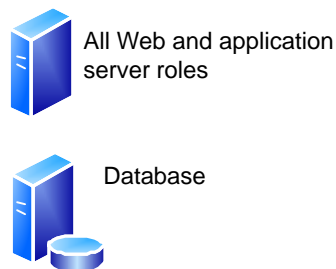
#### One-server farm

Evaluation or <100 users



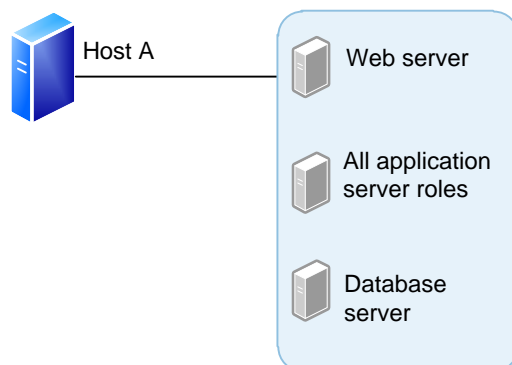
#### Two-tier farm

Up to 5,000 users



### Development environments

Mimic a three-tier environment by using virtualization.





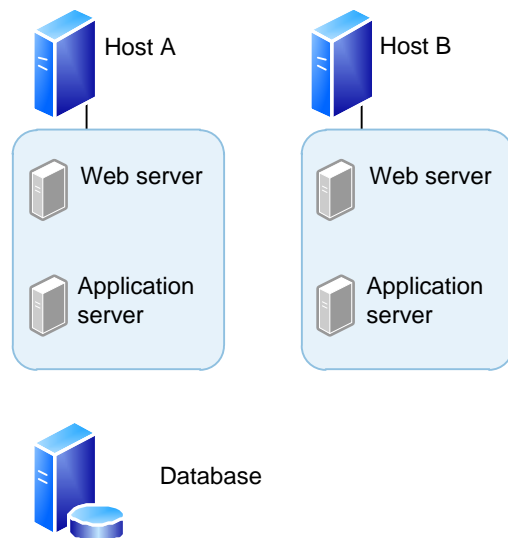
## Small multipurpose farms (3-4 servers)

Small farm architectures serve a larger number of users and scale out based on how heavily services are used. Not all small farms are fault-tolerant.

### Three-server virtualized farm

Use virtualization to maximize the potential of a smaller number of servers

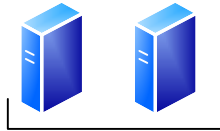
Two web servers are predicted to serve 5,000-10,000 users.



High availability — For environments above 1,000 users, two servers utilizing SQL Server clustering, mirroring, or AlwaysOn is recommended. AlwaysOn requires SQL Server 2012.

## Four-server physical farms

Add a dedicated application server for environments with moderate service usage.



Web/Query server



Application server



Database

If fault-tolerance of services is more important than user performance, configure the environment with redundant application servers instead of redundant Web servers.



Web server



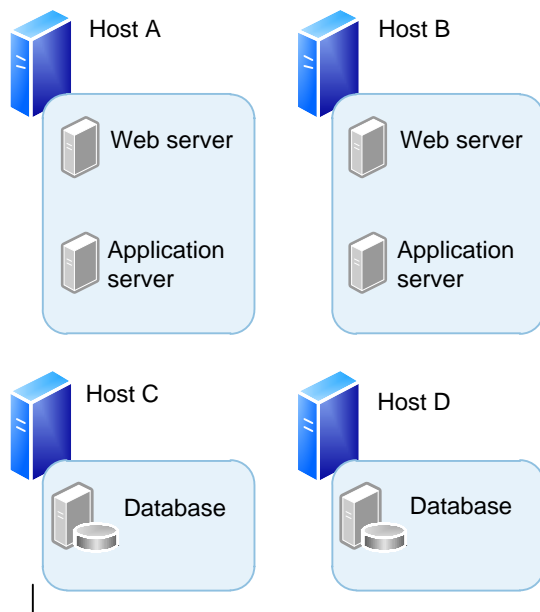
Application servers



Database

## Smallest fault-tolerant farm utilizing virtualization

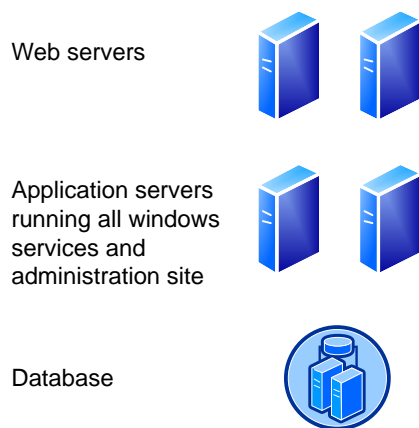
All server roles virtualized and distributed across two or four host servers (depending on the operating system) to provide fault tolerance using the minimum number of servers.



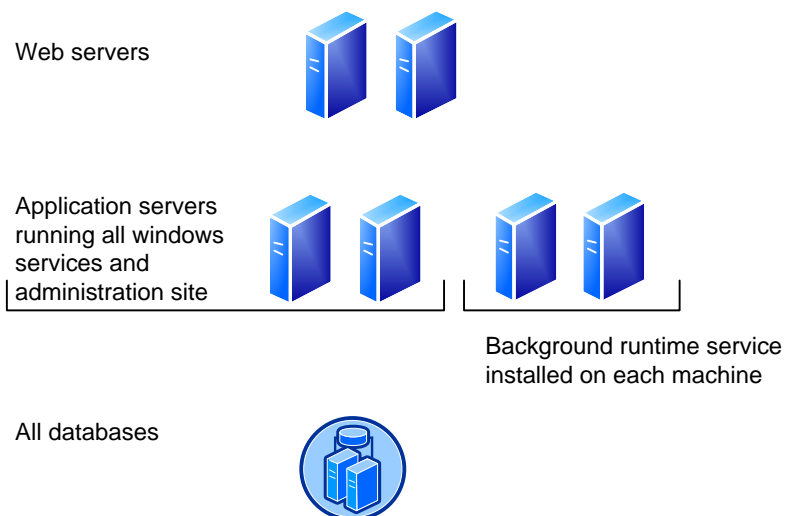
SQL Server installed and configured to support SQL clustering, mirroring, or AlwaysOn. AlwaysOn requires SQL Server 2012.

## Medium farm architectures (6+ servers)

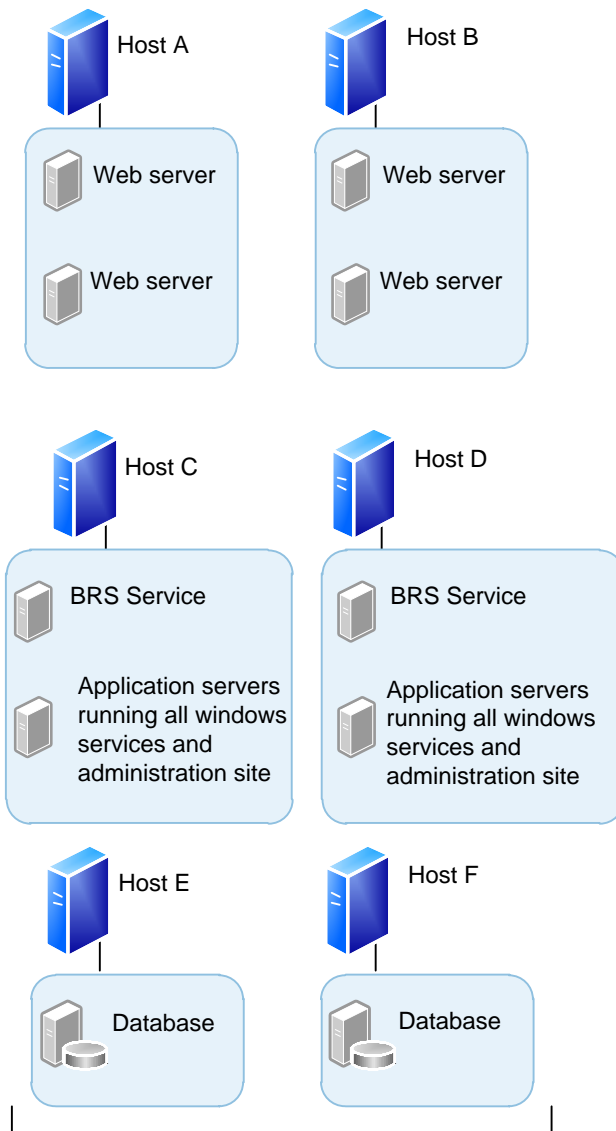
### Six-server physical environment



### Eight-server physical environment optimized for asynchronous Executions



## Six-server virtualized environment



SQL Server installed and configured to support SQL clustering, mirroring, or AlwaysOn across both of the hosts. AlwaysOn requires SQL Server 2012.

## Scaling Sequence Environment

### Scaling Out

As illustrated, the environment below (see next page) is designed to process 0.5 million Workflow Instances (~35 GB of data). The correlation between instances and volume of data will vary depending on the types of data that are persisted in a workflow execution. It is important to understand the characteristics of the Sequence usage within the environment. The table below provides starting-point numbers for Sequence components based on number of instances.

## Scaling out medium-size farms

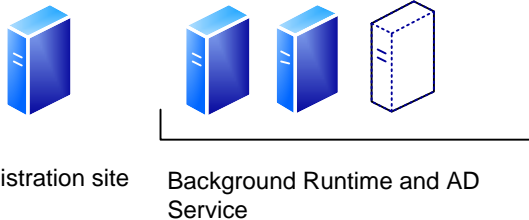
Scale out medium-size environments based on the workload. This illustrated medium server environment is scaled to host processes with large amount of instances. Scale the web servers and database servers as needed for growth. Scale out all other servers based on the utilization of windows services.

### Web servers



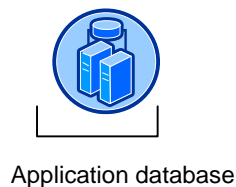
The number of users will affect the requirement for web servers. Factor 5,000 users per web server as a starting point. Adjust the number based on how heavily the servers are utilized. Heavy use of client services will increase the load on web servers.

### Application servers



Start with two application servers place the administration site on a separate application server. Based on utilization, consider adding application servers that host the background runtime service

### Database server



On very large volume of instance consider separating the archived records to a dedicated database or even a dedicated database server

## Starting-point numbers for components based on number of instances

Number Of Instances	Web server	Background service instances	Administration site	Reporting database
<b>General Guidance</b>	Add 1 web server per 100 Concurrent users	Add 1 Instance for every 1000 open instances	1	1
10,000	2	2	1	1
100,000	2	4	1	1
500,000	2	6	1	1



## Process<sup>TO GO</sup> - Infrastructure Design Considerations

### Extranet Design

When users on mobile devices require external access to a Sequence Mobile Application (Process<sup>TO GO</sup>), you must implement an extranet topology in your network. The following diagrams illustrate possible extranet topologies to choose from when planning external mobile devices access to your Sequence Application.

