Building a Highly Available Unified Communications Infrastructure with Microsoft® Office Communications Server 2007

Product Group - Enterprise

Dell White Paper

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Introduction

High availability of IT infrastructure is crucial for business operations. Business functions today are dependent on the availability and reliability of the IT infrastructure hosting business applications. Application downtime costs often include loss in productivity and lost revenue. Enterprise applications that facilitate internal and external communications such as e-mail and telephony are critical and require availability assurance. Microsoft® Office Communications Server 2007 (OCS 2007) offers communication technologies such as instant messaging, software powered Voice over IP (VoIP) and conferencing. Thus it becomes critical to ensure the availability of the infrastructure hosting an OCS 2007 deployment. This paper will highlight some of the methods and technologies that can help ensure high availability of an OCS 2007 deployment infrastructure.
Microsoft Office Communications Server
2007 components

The features and functions of OCS 2007 are implemented via the various OCS 2007 server roles. The high level features include IM, presence, web/audio/video conferencing, enterprise voice, communicator web access, archiving and external access. The core features such as IM, presence, conferencing, VoIP are implemented by front-end servers such as IM Conferencing server, Telephony Conferencing Server, Web Conferencing Server, Audio/Video Conferencing Server and Web Components (IIS) Servers. The core features also require a Microsoft SQL Server® based back-end database to store configuration information and state. Enterprise voice features supporting OCS 2007 integration with regular telephony network require an OCS 2007 Mediation Server. External access features require Access Edge Server, Web Conferencing Edge Server and Audio/Video Edge Server based on function requirements. Archiving capabilities require separate OCS 2007 archiving server and archiving back-end database based on Microsoft SQL Server. Communicator web access functions require a separate Communicator Web Access Server. Each of these server roles implement a certain set of OCS 2007 functions and require high availability based on the business criticality of the function implemented by the server role. OCS 2007 is offered in 2 editions:
- OCS 2007 Standard Edition, and

OCS 2007 Standard Edition

Standard Edition includes that all front end roles and the back-end database implementing the core OCS 2007 features be consolidated within one server. Figure 1 below illustrates a sample OCS 2007 Standard Edition deployment. Scaling the front-end servers beyond one server requires deployment of the Enterprise Edition. Hence standard edition will not be able to satisfy the server resiliency requirements preferred in certain deployments. Hardware and software failures incurred by the single standard edition server may result in downtime of the core OCS services. Hard failures may require replacement of hardware and reinstallation of software to bring the services back online.
**OCS 2007 Enterprise Edition**

The Enterprise Edition deployment supports scaling the front-end server roles into multiple servers to support larger deployments and offers server resiliency via the multiple front-end servers deployed. If one of the front-end servers incurs a failure, another front-end server can continue offering the services based on the configured functions. In addition, the back-end database needs to be hosted separately from the front-end servers, and availability of the database can also be ensured by various methods. Figure 2 below illustrates a sample OCS 2007 Enterprise Edition deployment. Besides the front-end servers and back-end database, the other server roles in OCS 2007 can be deployed in a highly available configuration. The later sections of the paper will discuss the high availability mechanisms supported for the different server roles.
Figure 2: Sample OCS 2007 Enterprise Edition Deployment
Deploying a Highly Available Microsoft OCS 2007 Infrastructure

High Availability for the Front-End Servers

Office Communications Server (OCS) 2007 Enterprise Edition offers high availability by eliminating single points of failure on the front-end server functions. Multiple front-end servers (pool) can be deployed which host the different functions: IM Conferencing, Telephony Conferencing, Web Conferencing, Audio/Video Conferencing and Web Components (IIS). The back-end SQL Server database must be deployed separately from the front-end pool servers. Thus the back-end database is segregated from front-end failures and also does not compete with front-end roles for hardware resources, thus improving front-end performance. Front-end pool servers require the deployment of a hardware load balancer. The load balancer exposes a single virtual IP address (VIP), and clients connect to this VIP instead of connecting directly to a front-end server. Whenever a server in the pool incurs failure, clients automatically reconnect to another server in the pool providing the same function. The clients may experience a brief interruption, but can re-connect to the service. During such interruptions, meeting state is preserved as it is not maintained on the front-end servers. The load balancer also distributes load (client requests) among multiple front-end servers, affecting scalability. Multiple front-end servers also enable maintenance operations such as server upgrades to be performed without downtime, by upgrading one server at a time.

The front-end server pool in the enterprise edition can be deployed in two ways: consolidated pool or expanded pool. In the consolidated pool all the front-end functions are deployed on all the servers in the pool as shown in Figure 3 below. The hardware load balancer is connected to the pool and load balances incoming requests. The expanded pool configuration is shown below in Figure 4. In expanded pool, the IM and telephony conferencing roles are deployed on the front-end servers. The web conferencing, audio/video conferencing and web components (IIS) functions are deployed on separate groups of servers. The front-end pool and the web components group require a load balancer and can share the same load balancer. The web conferencing servers are deployed as a separate group and so are the audio video conferencing servers. These groups can be scaled independently based on load conditions. For example, if the deployment incurs more audio/video traffic, then additional servers can be added to the audio/video conferencing pool to handle increasing load. The segregation of roles enables satisfying resource requirements of each role independently and also ensures that one function does not impact the performance of other roles.
Figure 3: Consolidated Front-End Pool
High Availability for the Back-End Database

The back-end database in the Standard Edition is part of the single server hosting all front-end functions and thus is not resilient to server failure. The Standard Edition installation software includes Microsoft SQL Server 2005 Express Edition and can be installed as part of the deployment process. In the enterprise pool deployment the back-end database is separate from the front-end pool. Thus the back-end is not impacted by front-end failures and also can be run with its own set of hardware resources assuring performance. The back-end database server can
be optionally clustered to improve its resiliency and avoid single point of failure. The back-end Microsoft SQL Server database may be configured in a two-node active-passive cluster configuration based on Microsoft Cluster Services (MSCS). If the active server fails, the database application (SQL Server) will fail-over to the passive server node. The passive node hosts the database after fail-over and continues providing the database service. The database data is stored on a shared external storage connected to both server nodes, facilitating availability of data to the passive node after fail-over. To deploy a MSCS cluster for the back-end database server, an appropriate edition of the Windows Server® operating system is required. For instance, in Windows Server 2003, only Windows Server 2003 Enterprise Edition supports clustering. In addition, an external storage device is required for the cluster deployment, and the cluster solution has to be listed on the Windows Server Catalogue as certified for Microsoft Cluster Service (MSCS). Figure 5 below depicts a SQL Server back-end database deployed on a MSCS cluster. If an existing MSCS infrastructure is used, it is recommended that the back-end SQL Server database be deployed as a separate instance and on a separate cluster node.

Figure 5: MSCS Clustered Back-End Database
High Availability for the Edge Servers

There are three Edge Server roles in OCS 2007 deployments: Access edge, Web Conferencing edge and Audio/Video conferencing edge. These edge roles enable the different external access functions required and facilitate communications between internal and external users. The edge server roles reside in the perimeter network of the enterprise. Depending on the features deployed, the edge server topology may include one or more edge server roles. OCS 2007 supports different deployment topologies for the edge roles. Scaled topologies where multiple edge roles of each type are deployed offer server high availability. If one of the edge servers in the pool fails, another server in the pool hosting the same edge role will continue providing service. Scaled topologies require a hardware load balancer for the edge roles to load balance traffic passing across each role. OCS 2007 supports only certain scaled topologies and configurations for the edge roles. Further information and exact supported configurations can be obtained in the OCS 2007 Edge Server deployment documentation available with the product. Figure 6 below depicts a scaled single-site topology. In this configuration the access edge and web conferencing edge roles are both deployed on multiple servers and load balanced by a hardware load balancer. The audio/video conferencing edge role is deployed on a separate set of servers and load balanced as well.
Figure 6: Single-site Edge Server Topology with High Availability

Optionally, OCS 2007 includes a Director role that can be deployed to offload authentication of external users trying to connect and access internal functions. The director is recommended for deployments supporting large number of users. Multiple directors can be deployed in a scaled out topology, and they can be load balanced using a hardware load balancer. Server availability is ensured by the multiple servers so that if one server in the pool fails, other servers in the pool continue providing availability.

**High Availability for the Archiving Service and Database**

OCS 2007 archiving function is provided by archiving & CDR (Call Detail Record) agents running on front-end OCS servers, archiving & CDR Service and back-end archiving database. They enable archiving the instant messaging content of conversations between users and also the call detail records which capture conversation metadata for voice, video and conference communications. The archiving service and database can be run on the same server machine to
form a single-tier topology. Alternatively the archiving service and database can be run on separate servers to form a two-tier topology. In OCS 2007 Standard Edition there is only one front-end server; hence only one archiving server and database is required. This configuration is not resilient to failures. In OCS 2007 enterprise pool deployment there is a pool of front-end servers. Each front-end server can be connected to its own corresponding archiving service server, or a subset of front-end servers can share an archiving service server. The front-end servers are statically connected to the archiving service and cannot be dynamically changed. When archiving is run in the critical mode, non-availability of archiving service will result in the shutdown of the corresponding front-end server. In the critical mode, if the archiving service is shut down because of server failures or for maintenance, the corresponding front-end servers serviced by the failed archiving service will shut down services as well. Users will be redirected to the remaining front-end servers in the pool. The archiving back-end database can be deployed as a separate tier and the archiving service server machines can share the same back-end database or multiple database instances in the second tier. The databases in the second tier can be clustered to increase resiliency similar to the enterprise pool back-end database. Figure 7 below illustrates a sample enterprise deployment with each of the consolidated front-end pool servers connecting to a separate archiving service server machine. All the archiving service machines share the same back-end database, which is clustered using MSCS to improve database resiliency.
Figure 7: Two-tier Archiving and CDR Service Topology with High Availability
High Availability for Other Components

Enterprise voice (software powered VoIP) features require integration of OCS 2007 deployment with telephony components such as PBX systems and/or PSTN. Optionally, VoIP gateways may be required for deployment to support PBX systems which are not IP based or do not support direct integration with OCS 2007. OCS 2007 requires the mediation server role to support PBX/PSTN integration. The mediation server is connected to the VoIP gateway or PBX directly. To improve resiliency, multiple mediation servers may be deployed and connected to multiple VoIP gateways appropriately. Each mediation server can be pointed to only one gateway. Hence call routing between PBX and OCS 2007 via multiple VoIP gateways and multiple mediation servers must be configured appropriately.

OCS 2007 deployments may include complementary Exchange Server 2007 deployments for e-mail and unified messaging functionalities. The unified messaging role provides the feature of storing telephony voicemail as e-mail and also provides voice access to user mailbox via an auto attendant. Exchange Server 2007 provides various high availability methods such as Single Copy Clustering (SCC), Clustered Continuous Replication and Standby Continuous Replication (SCR) for the mailbox server role. Other Exchange Server 2007 roles such as Hub Transport, Edge Transport and Unified Messaging servers can be deployed in scaled configurations with multiple servers for each role to improve resiliency. These configurations and high availability methods are described in detail with the Exchange Server 2007 documentation.
Conclusion

Office Communications Server 2007 provides various sets of communications features and functions implemented by various server roles and components. High availability can be implemented for each of these components in a number of ways. Choice of implementation may depend on various factors such as cost, complexity and availability levels desired. Where possible, the set of critical functions that require availability may be prioritized and provided availability using the methods outlined. Business IT departments should carefully assess their high availability requirements before deploying Office Communications Server 2007. Dell™ PowerEdge™ servers, Dell PowerVault™ storage and Dell | EMC storage offer a suitable platform for hosting a highly available OCS 2007 infrastructure. Dell also offers Microsoft SQL Server solutions for hosting the OCS 2007 back-end databases and also offers complementary Microsoft Exchange Server 2007 solutions for hosting e-mail. These solutions provide a comprehensive, highly available platform for implementing an OCS 2007 infrastructure.

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