LANDesk Service Desk Suite Technical Specifications and Architecture Guidelines

LANDesk

Document number 6080/RLS/005 Issue 4.4

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1 General

This document describes the software components that make up a complete LANDesk Service Desk Suite installation. It provides an overview as to the features provided by each software component and how each component should be deployed. Also recommended are typical hardware specifications for different deployment models and the typical sizes of such deployments.

2 Software Components

2.1 General

This section describes all the software components that are part of the LANDesk Service Desk suite.

2.2 Server Components

The components described in this section are applications that run on a server computer within the LANDesk Service Desk model. Due to the n-tier nature of the LANDesk Service Desk model these server components not only provide services to desktop (or client) components but also provide services to other server components themselves.

2.2.1 Database Server

Service Desk supports Microsoft SQL Server and Oracle Relational Database Management Systems (RDBMS). The database server software is not provided as part of the Service Desk software. The database server runs the chosen RDBMS and hold the Service Desk database schema and Service Desk data. The server operating system running the RDBMS can be any server operating system supported by the RDBMS. So, for Microsoft SQL Server this is any appropriate Microsoft operating system. For Oracle this includes non-Microsoft operating systems (UNIX, Linux).

The database schema is used to hold the Service Desk data and is accessed via the Service Desk application server (LANDesk Services (TPS)) or by Crystal Reports components. No business functionality is implemented as part of the database schema, there are no stored procedures, triggers or other RDBMS features installed as part of the Service Desk database.

Communication between the Service Desk application servers (LANDesk Services (TPS)) is typically over a TCP/IP network using ADO.NET.

The storage mechanism can be any mechanism supported by the RDMS. For example, a local disk or a SAN are supported by the RDBMS.

2.2.2 Knowledge Base Data Files

The knowledge base features of Service Desk deliver free text search capabilities to Service Desk applications. As such, some of the data held in the Service Desk RDBMS is also held in free text data files. These files are held in a location which can be accessed by LANDesk Services (TPS). This may be a local disk, a network file share or some other file storage mechanism, such as a SAN. There are no Service Desk server components other than LANDesk Services controlling access to these data files.

2.2.3 Microsoft Windows Server Operating System

All server components of Service Desk are developed using Microsoft .NET and as such are supported on 32-bit and 64-bit architectures. The supported platform guide details the Microsoft operating systems supported.

Crystal Reports, delivered as part of the Service Desk product to deliver reporting capabilities is not a Microsoft .NET application and is supported only on 32-bit platforms.

2.2.4 Microsoft Internet Information Server (IIS)

A core component of the Service Desk server software is Microsoft IIS. Many of the server applications delivered are delivered as Microsoft ASP.NET applications. All servers running Service Desk software also run Microsoft IIS.

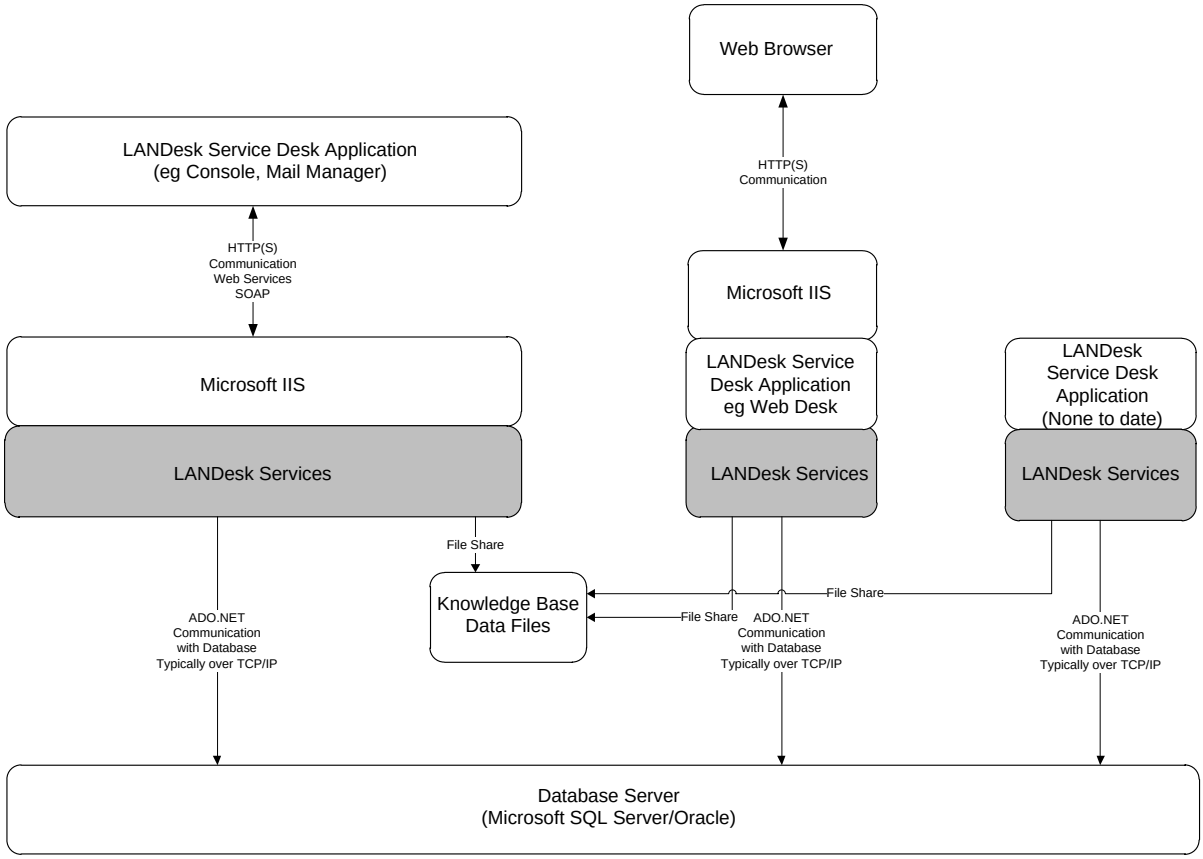
2.2.5 Microsoft Terminal Services

One of the deployment models described later in this document is the capability of delivering the Service Desk Console application in a terminal services environment. As such a server running Microsoft Terminal Services and other presentation services such as Citrix may also form part of the server architecture.

2.2.6 LANDesk Services (TPS)

LANDesk Services is the core application server of the LANDesk Service Desk suite of applications. It provides services in the way of programming interfaces in order to develop client applications that deliver LANDesk Service Desk functionality to users. The Services application server is deployed as either a web application hosted on Microsoft Internet Information Server (IIS) or as a set of DLLs as part of another server component. It provides a Web Services programming interface and a .NET programming interface for the development of applications. All LANDesk Service Desk applications use the features of LANDesk Services. Access to the LANDesk Service Desk database is provided through LANDesk Services (TPS).

Multiple instances of TPS can be installed and run as part of a Service Desk deployment model to provide application load-balancing and scale-out features. One instance of TPS is used to provide application server features for a number of different client applications.

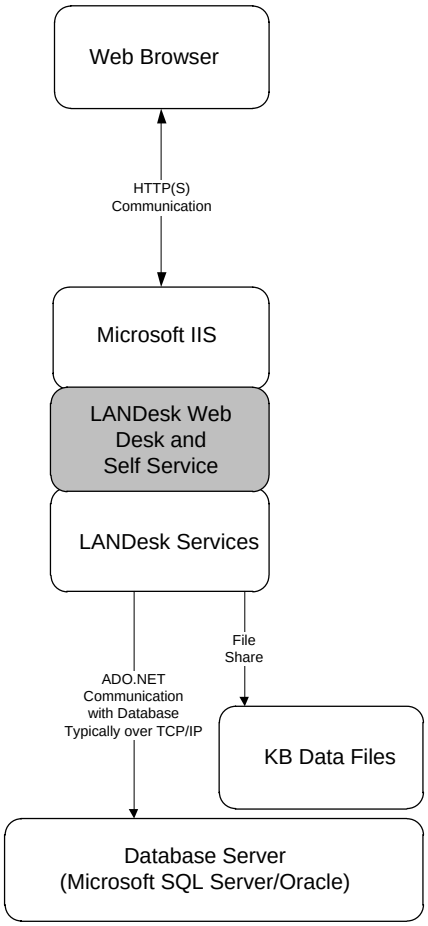


2.2.7 LANDesk Web Desk and LANDesk SelfService

LANDesk Web Desk and LANDesk Self Service applications are a web server application hosted on Microsoft IIS that provides a browser-based interface for LANDesk Analysts, end users and customers. It uses LANDesk Services (TPS) built in-process to deliver application server features.

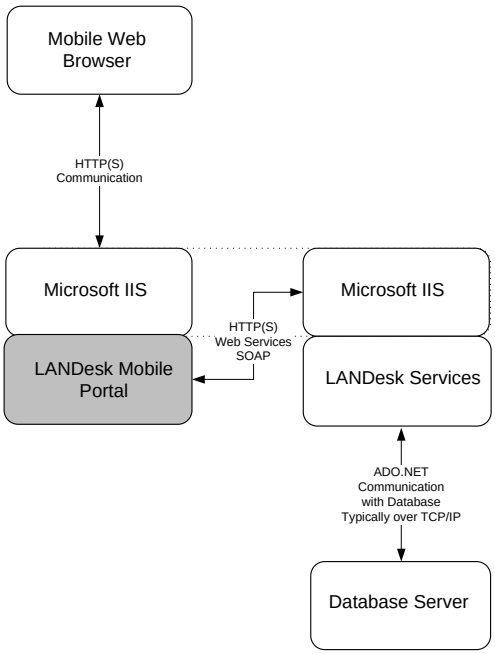
Both applications are delivered as one software component; the features delivered to the user are driven by how the user accesses the application. A user who logs on as an analyst will be delivered up the LANDesk Web Desk application features. A user who logs on as a customer or end user will be delivered up the LANDesk Self Service features.

Multiple instances of LANDesk Web Desk and LANDesk Self Service can be installed and run as part of a Service Desk deployment model to provide application load balancing and scale out features.



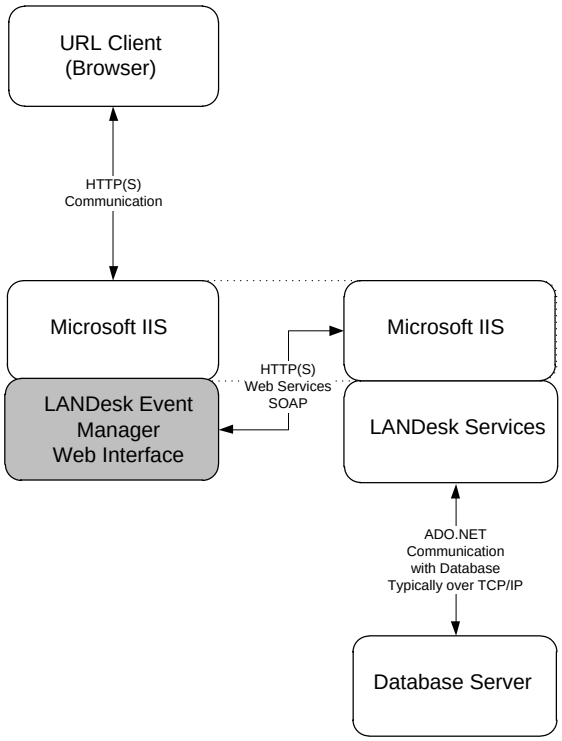
2.2.8 LANDesk Mobile Portal

Mobile Portal provides a mobile browser interface to certain Service Desk features. Access to this application is via a browser running on a mobile (or desktop) device.



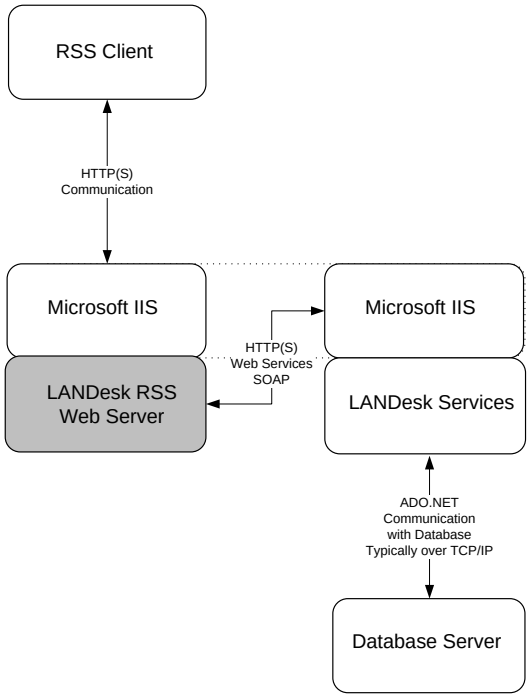
2.2.9 LANDesk Event Manager Web Interface

The Event Manager Web Interface provides an integration point with 3rd part applications. Another application can be configured to 'call' a Service Desk URL to perform an action in the Service Desk application. The interface is typically used to link network management tools to Service Desk. An event is detected by an event management tool, which is then configured to call this interface via a URL to create an incident in Service Desk with data collected from the network management tool.



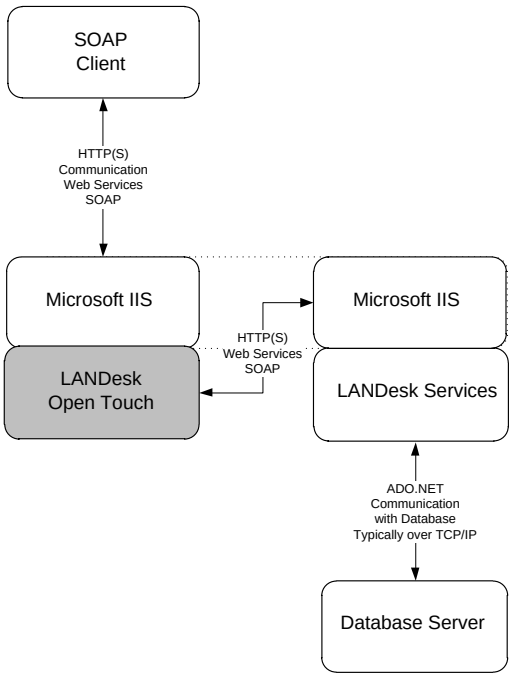
2.2.10 LANDesk RSS Server

The RSS Server delivers Service Desk data to RSS clients via RSS feeds in a similar manner to any other RSS feed. RRS data feeds can be configured to deliver any data from the Service Desk application.



2.2.11 LANDesk Open Touch Web Services

The Open Touch interface provides a web services interface used by application developers to develop client applications which perform actions or read information from the Service Desk application. For example, a developer may wish to integrate Service Desk data into their own portal through this mechanism.



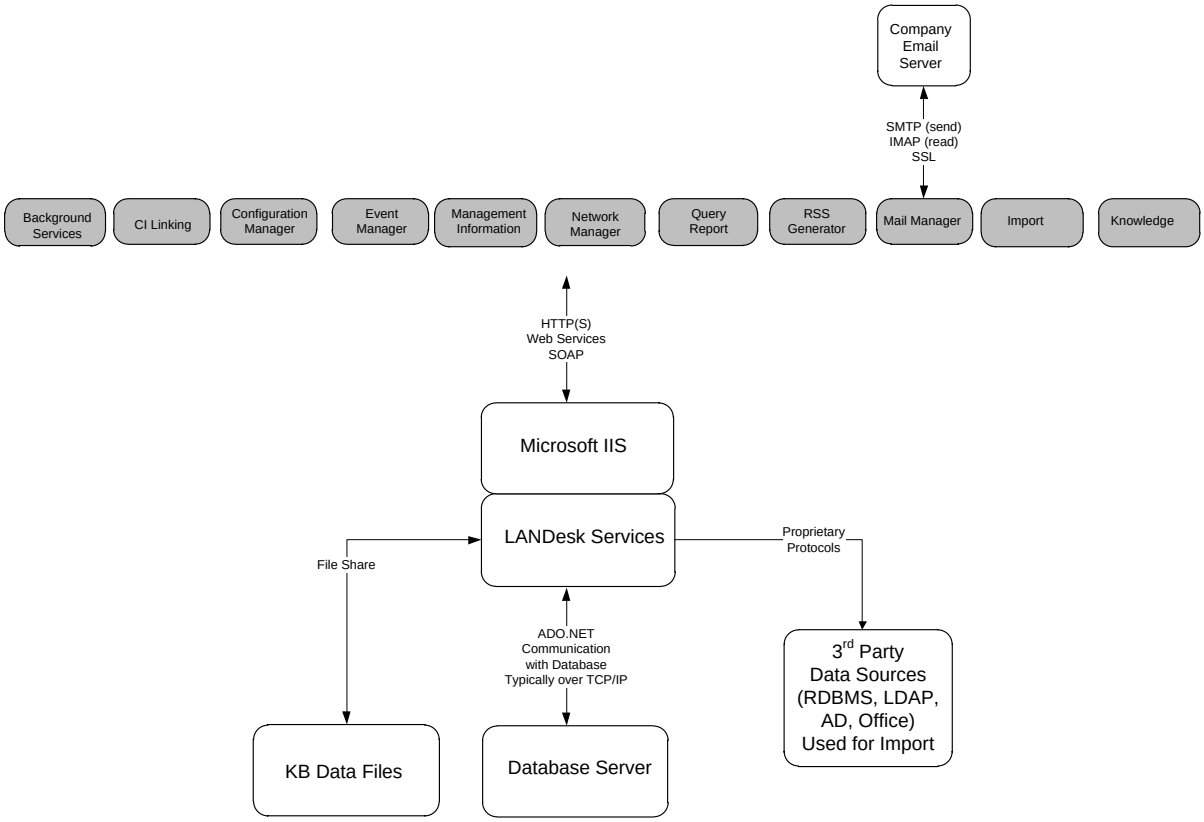
2.2.12 LANDesk Application Services

2.2.12.1 General

LANDesk application services are applications that run as Windows Services. They run on the LANDesk Application Services Server and perform background tasks. These tasks are varied and typically are used to maintain data within the Service Desk application, act on events occurring externally or internally, or notify people of the occurrence of events. All application services communication with the LANDesk Services (TPS).

These services are installed and run on the LANDesk Application Services server. The following application services are delivered as part of the Service Desk application. Which services are used depends on the functionality delivered as part of a specific Service Desk installation.

- Background Services
- Knowledge Service
- CI Linking
- Configuration Manager
- Event Manager
- Management Information
- Network Manager
- Query Report Service
- RSS Generator
- Mail Manager
- LANDesk Import



2.2.13 Crystal Enterprise Report Server

Reporting capabilities are delivered through Crystal Reports. Crystal Enterprise report server is a Microsoft IIS ASP application that delivers reporting capabilities via a browser interface. It also includes application services that can be used to provide features such as automatic scheduling of report generation. A report designer component is also provided as part of the enterprise server software.

Reports are provided as part of the Service Desk software and can also be written using the Crystal Report Designer component either via the Enterprise Server or via the Crystal Report Designer client application.

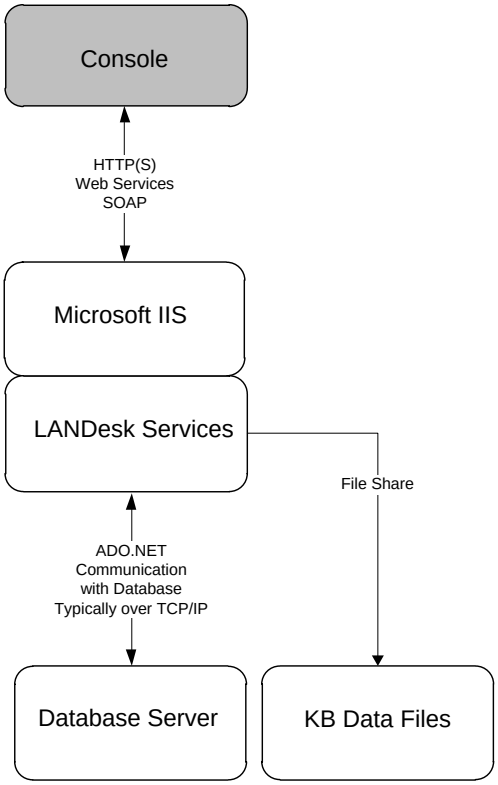
When run, a report connects to the RDBMS using any mechanism supported by Crystal Reports. Typically this is by an OLEDB connection.

2.3 Client Components

This section describes the client software components that make up a Service Desk installation. Client components in this sense can be described as components that run on computers that are not controlled as part of the server environment described above. So for example, although Web Desk delivers a client interface via a browser, it is not treated as a client component as it runs in the server environment. The browser makes up the client component in this case.

2.3.1 Console

When the Service Desk Console is installed and run on a client computer, it runs as a client component. It communicates with LANDesk Services via HTTP(S) using SOAP and Web Services.

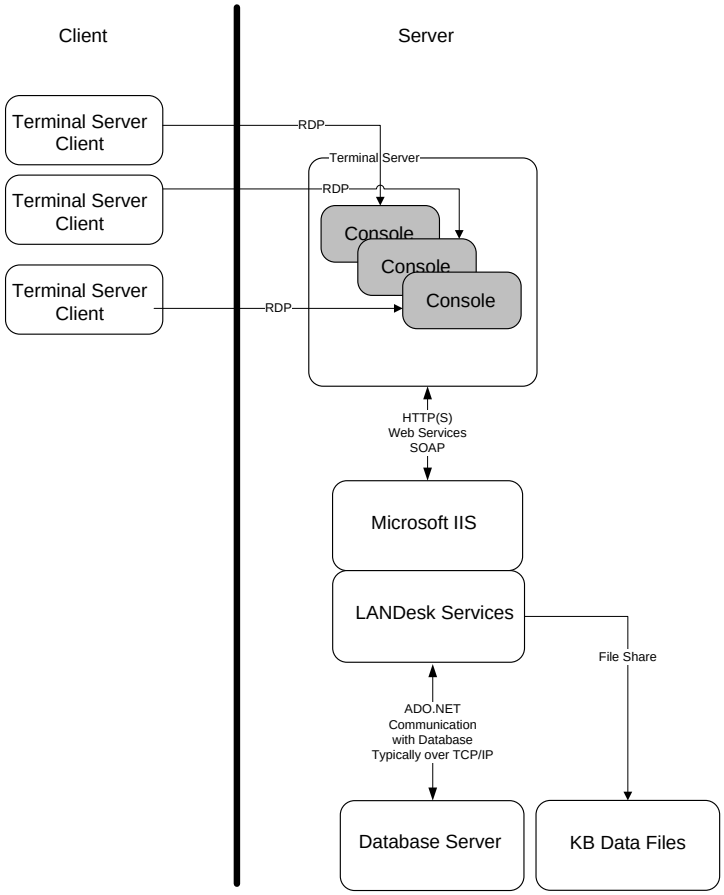


2.3.2 Browser

An internet browser is used to access all the browser interfaces provided by Service Desk, including Self Service and Web Desk, the 2 main browser-based interfaces. A number of different browsers (and therefore client operating systems) are supported. For example, a user may access Web Desk via Microsoft Internet Explorer running on a PC running a Windows operating system. A user may also access Web Desk via the Safari browser running on an Apple Macintosh operating system. The browsers supported by Service Desk are defined in the supported platforms documentation.

2.3.3 Terminal Services

When the Service Desk Console is delivered via terminal services, the terminal server and Console sessions are running as part of the server architecture described above in the server components section. In this scenario, the client component running is the terminal services client such as the Citrix client or RDP client.



2.3.4 Crystal Reports

2.3.4.1 Design and Run Reports

The Crystal Reports designer tool can be installed and run on a client desktop. This application is used to develop and run reports and requires a direct connection to the database server.

2.3.4.2 Running Reports from Console

Reports can also be run from within the Console application using a runtime component of Crystal Reports. If configured, this feature of Console also requires a direct connection to the database server. Alternatively, access to reports via the web interface of Crystal Reports (Crystal Enterprise) can be provided via the Console.

2.4 Data Requirements

Data is held in two data stores:

- A relational database (RDBMS)
- A Free Text Search data store (File System)

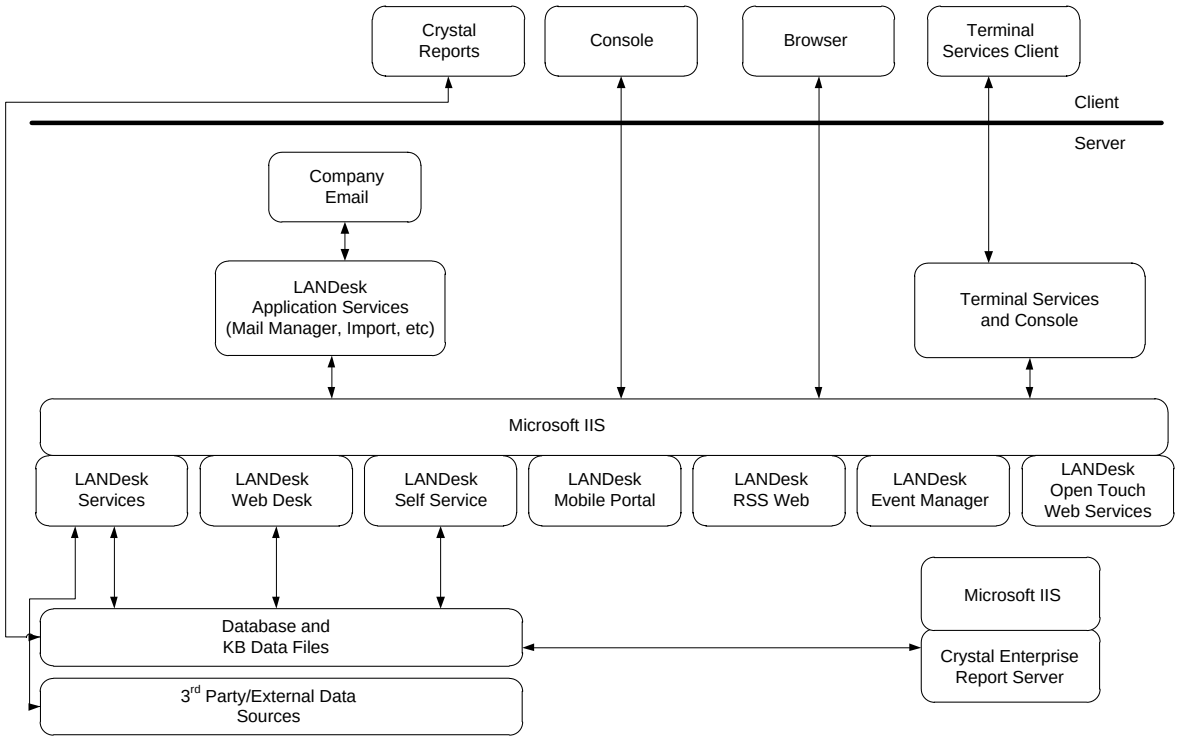
The RDBMS (Microsoft SQL Server or Oracle) is the main repository for all data. All application accesses this data via the application server software (LANDesk Services, TPS). The only exception to this data access is access via Crystal Reports components as described above.

The free text search data store is a set of files holding data extracted from the RDBMS and used to perform free text searching techniques rather than RDBMS-type searching. This data is used to

deliver knowledge base features within the application. The data store and technology used to deliver the free text searching features is provided by Lucene.

2.5 Overview Software Components

The following diagram shows a logical view of all the software components that make up the application.



3 Deployment

3.1 General

This section describes the recommended deployment model for the software components described above. This deployment model is described in terms of on overall deployment taking into account scale out, load balancing and high availability features. A physical deployment model is described; however, a virtual environment can be used to deploy all software components.

The following server types are used to describe in summary the role of that particular server.

- **Database Server –** The server running the RDBMS software (Microsoft SQL Server or Oracle) and associated database schema (data storage)
- **Web Server –** The server running the web applications components, these being:
    - LANDesk Services
    - LANDesk Web Desk
    - LANDesk Self Service
    - LANDesk Mobile Portal
    - LANDesk RSS Web Services
    - LANDesk Event Manager
    - LANDesk Open Touch
- **Application Services Server –** The server running the LANDesk application services, these being:
    - Background Services
    - CI Linking
    - Configuration Manager
    - Event Manager
    - Management Information
    - Network Manager
    - Query Report Service
    - RSS Generator
    - Email Manager
    - LANDesk Import
    - Knowledge Service

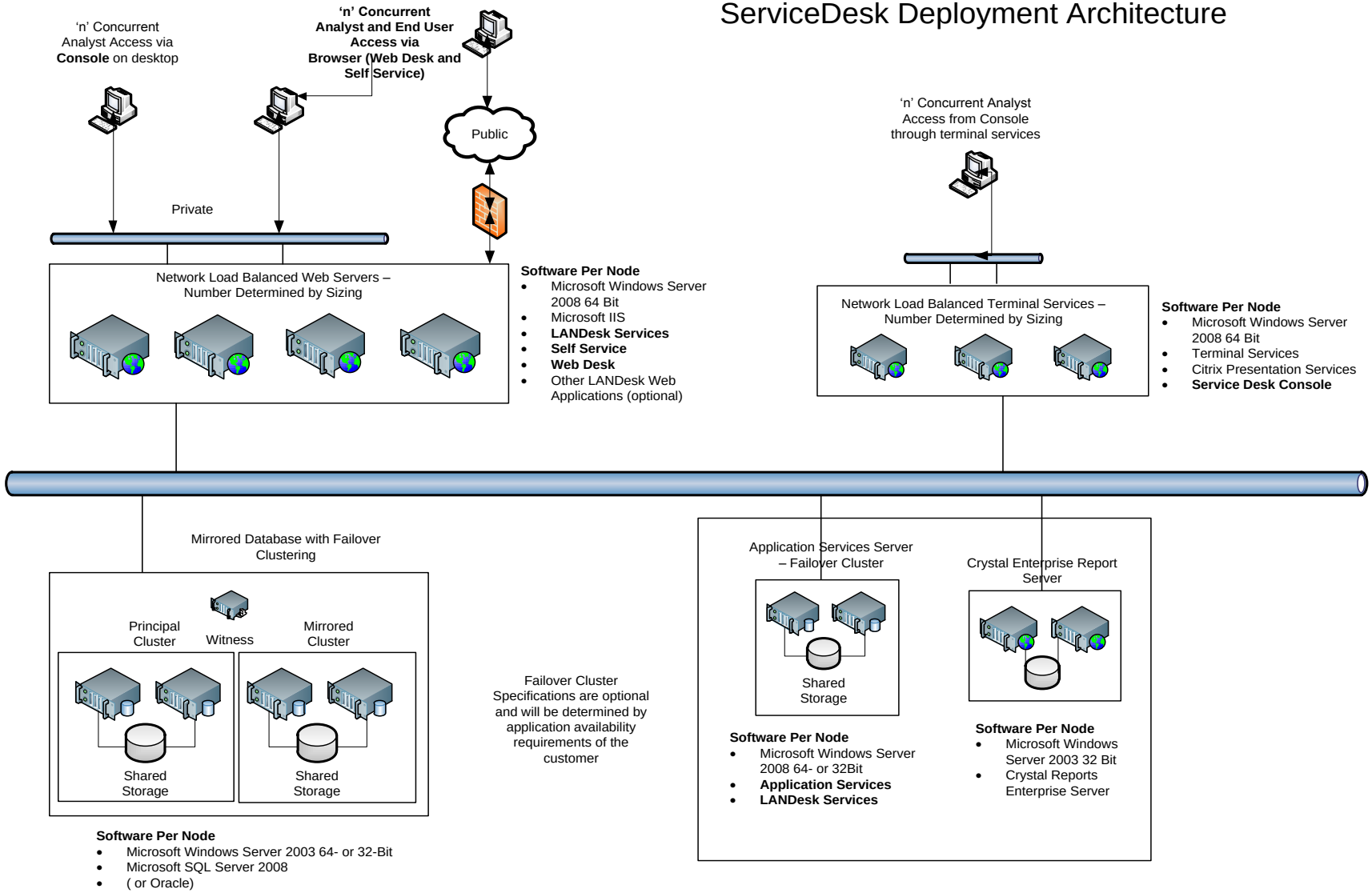
If heavy load is expected (or experienced) for certain application services, these services can be split across a number of servers. For example, knowledge services (with accompanying LANDesk Services

(TPS)) could be installed and run on their own server if high usage in terms of creating and updating the knowledge base is envisaged.

- **Crystal Enterprise Server –** The server running the Crystal Enterprise server software.
- **Terminal Services Server –** The server running terminal services and multiple instance of the Service Desk Console application.

The following diagram describes a recommended deployment model for Service Desk software.

ServiceDesk Deployment Architecture



3.2 Scale Out and Load Balancing

To ensure the application performs to an acceptable level, scale out and load balancing features are supported by the application, specifically for the user interface components of the application, those being Console, Web Desk, Self Service and Mobile Portal. Additional Web Servers can be added to the deployment to cater for increased load.

If a terminal server farm is used to deploy the Console application, this again can be deployed using load balancing to provide scale out and high availability features.

The number of web servers and terminal servers required per deployment is described later in this document.

3.3 High Availability

The load balancing features described above also provide high availability scenarios in case of web server or terminal server failure. Other servers can also be configured to deliver a high availability system. In particular:

3.3.1 Database Server

Any high availability technology supported by the underlying RDBS (Microsoft SQL Server or Oracle) can be used to deliver a high availability database server deployment. The diagram above shows a configuration using SQL Server database mirroring and failover clustering to provide such a high availability database server. If an Oracle RDBS solution is used then technologies and concepts supported by the Oracle platform for high availability can be used (eg Oracle Real Application Clusters).

3.3.2 Application Services

There is only ever one running instance of all application services at any one time running on the application services server. In case of server failure, a failover cluster configuration can be deployed.

3.3.3 Crystal Report Server

The Crystal Report server runs Crystal Enterprise Server and background crystal report services. It is recommended again that there is only one running instance of these applications is available at any time. Again, failover clustering can be provided to provide high availability.

The web interfaces of Crystal Enterprise are the most common features of Crystal used within a deployment and as such these can be deployed using a network load balancing model as described above for the web servers.

4 Hardware and Operating System Software Recommendations

4.1 General

This section describes the recommended hardware specifications for the different server types described above. It also defines the recommended operating system software to be used on each server. For a concise list of all supported software platforms, refer to the Service Desk supported platforms documentation. How many of each of these servers is required is described later in this document.

4.2 Recommended Server Specifications

4.2.1 Database Server (SQL Server or Oracle)

- Microsoft Windows Server 2008 Standard 64-bit Edition
- Quad-core 2.66 GHz CPU
- 8 GB RAM
- Capacity and growth requirements will depend on the type of deployment. See *Data Storage Requirements* on page 21 for growth and capacity recommendations
- RAID Level 1, Level 5 or Level 10 (1+0) drive. (Any RAID specification is supported, however these are typically the configurations used)
- Redundancy and failover technologies implemented by the relevant RDBMS and customer specific policies for RDBMS choice and architecture will typically determine the specification and operation of the RDBMS platform. No specific Service Desk dependencies exist.

4.2.2 Web Server

- Microsoft Windows Server 2008 Standard 64 Bit Edition
- Quad-core 2.66 GHz CPU
- 8 GB RAM
- 10 GB of available disk space (required for installation of software only, no data requirements)

4.2.3 Terminal Services Server

- Microsoft Windows Server 2008 Standard 64 Bit Edition
- Quad-core 2.66 GHz CPU
- 16 GB RAM
- 10 GB of available disk space (required for installation of software only, no data requirements)

4.2.4 Application Services Server

- Microsoft Windows Server 2008 Standard (64 or 32 Bit Edition*)
- Dual core 2.66 GHz CPU
- 4 GB Ram
- Software - 10 GB of available disk space (required for installation of software
- Data Files - Capacity and growth requirements will depend on the type of deployment. See *Data Storage Requirements* on page 21 for growth and capacity recommendations. This disk capacity is required to hold the knowledge base data store.
- RAID Level 1, Level 5 or Level 10 (1+0) drive. (Any RAID specification is supported, however these are typically the configurations used).

4.2.5 Crystal Reports Server

- Microsoft Windows Server 2003 Standard (32 Bit Edition)
- Dual core 2.66 GHz CPU
- 4 GB RAM
- 10 GB of available disk space (required for installation of software only, no data requirements other than report files)

4.2.6 Data Storage Requirements

The following data storage requirements are recommended:

4.2.6.1 Software Files

Each computer where the software is installed must have local disk capacity available to store the software files. A full install of the Service Desk software takes up less than 1GB disk space.

4.2.6.2 RDBMS

The storage requirements of the database depend on the usage of the application. A delivered database for a new install is no bigger than 1GB.

The database will grow at a rate of between 0.1-0.3 MB per new incident (IPC) created. This figure is variable based on the design and usage of the application; however, the suggested rate has been extrapolated based on existing real installations. This data growth takes into account all data held within the database.

4.2.6.3 Knowledge Data Files

A similar data growth value of between 0.1 – 0.3 MB is also estimated for the free text search data files. This assumes all data is selected for inclusion in this data store and so is seen as a conservative estimate.

It is recommended that the location of these files should be local to the application services server installed with the services responsible for creating and updating this data store. However, as the data store is accessed from multiple different applications (Console, Web Desk, Self Service), network access to the files is a requirement.

4.3 Minimum Desktop Specification

This desktop specification relates to any desktop running the Service Desk Console application. The minimum specification is not a requirement for users accessing the Service Desk application through a browser or via a terminal services client from a desktop.

- Dual 2.0 GHz CPU
- 2 GB RAM
- 1 GB of available disk space

5 Sizing

5.1 General

Sizing is used to determine the number of servers that will be required to deploy a system that will cater for the expected or estimated usage of the application. These figures should be taken as recommended guidelines. Each individual customer will have their own set of requirements and metrics used to determine the deployment scenario. The following deployment scenarios are provided as examples.

5.2 Metrics

The following metrics are used to estimate the size of a particular deployment.

- Number of Analysts
- Concurrent Number of Analysts
- Number of End Users
- Concurrent Number of End Users
- Number of concurrent Analysts using Console via Desktop installation
- Number of concurrent Analysts using Console via Terminal Services
- Number of concurrent Analysts using Web Desk
- Number of incident, problems and changes raised per day
- Number of incident, problems and changes updated per day

Some fixed parameters are also used in determining sizing, these are:

- Maximum number of concurrent analysts per web server
- Maximum number of concurrent end users per web server
- Maximum number of concurrent Console analysts per web server
- A maximum of 40 analysts per terminal server for Console access. This figure is based on industry recommendations for a small to medium business application running as many sessions in a terminal server environment for the hardware specification described above (for the terminal server).

Using these figures, 3 different deployment models are provided as examples based on the size of the deployment. For a more detailed analysis and breakdown of sizing please refer to LANDesk professional services.

Each of the following scenarios also delivers different options in terms of load balancing and server availability scenarios.

5.3 Failover and High Availability

A number of the following deployment examples define a high degree of redundancy to cater for failover and high availability scenarios. The decision as to whether this level of deployment is required will be different for different customers. For example, a high redundancy database configuration may be replaced with a simple backup strategy so reducing the number of servers required.

In particular, the high availability and failover features provided by the RDBMS will be specific to the RDBMS chosen (SQL Server or Oracle). Any such feature supported by the RDBS can be used in conjunction with Service Desk.

5.4 Consolidating Server Roles

The following example deployment models keep server roles separate. So for example there is always a database server that is separate from the web server role. These roles can be consolidated so reducing the number of servers deployed. Again this decision would be made on a per customer basis, based on a number of factors including cost and usage.

5.5 Small, Test and Development Deployment

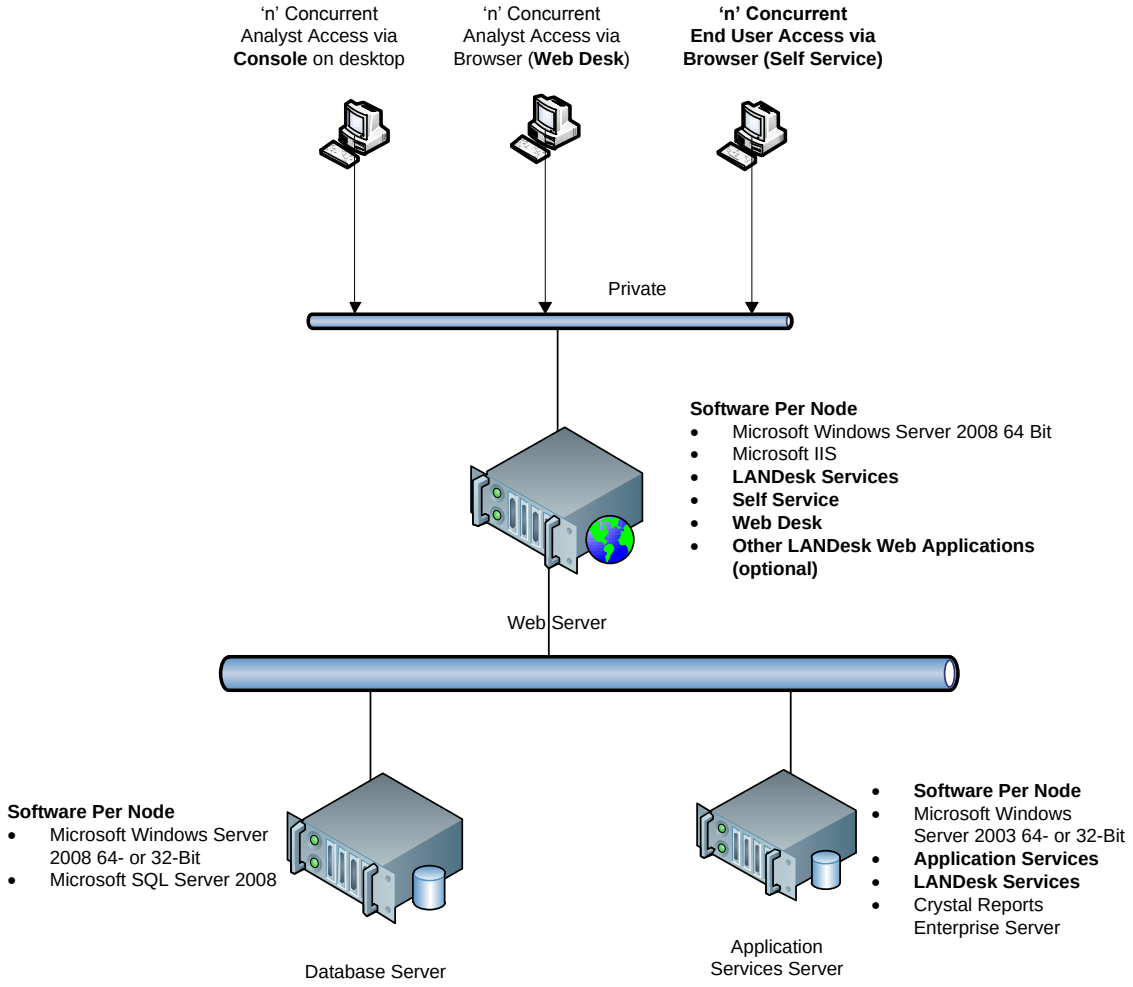
The following figures determine this type of deployment.

Max. No. of Analysts	10	This is the no. of analyst licences
Max. No. of Concurrent Analysts	10	Assumption is that all analysts work at the same time
Max. No of End Users	1000	This is the no. of end user licences
Max. No. of Concurrent End Users	10	Assume 1% of end users are connected at the same time
Concurrent Analysts using Console desktop	10	Assume all analysts use Console installed on a desktop
Concurrent Analysts using Console via terminal services	0	No terminal services access
Concurrent Analysts using Web Desk	10	Assume analysts interchange between Web Desk and Console
No. of incidents, problems, changes (IPC) raised per day	100	Maximum of 10 new IPCs created per analysts. (Some may be raised by end users via Self Service)
No. of incidents, problems, changes (IPC) updated per day	100	Maximum of 10 IPCs updated per analysts. (Some may be raised by end users via Self Service)

The following deployment model is recommended for this scenario.

No. of Web Servers	1	
No. of Application Services Servers	1	This server consolidates LANDesk application Services, and Crystal Reports Enterprise Server
Database Server – Disk Capacity (Growth)	5GB per year	Assume 0.2 MB of database disk capacity required for each new IPC created. Assume 250 working days per year. 0.2*100*250 = 5000MB
Knowledge Base – Disk Capacity	5GB	As above, assuming all IPC data is configured as

(Growth)	per year	knowledgeable.
Additional Comments		No load balancing or failover features are provided.



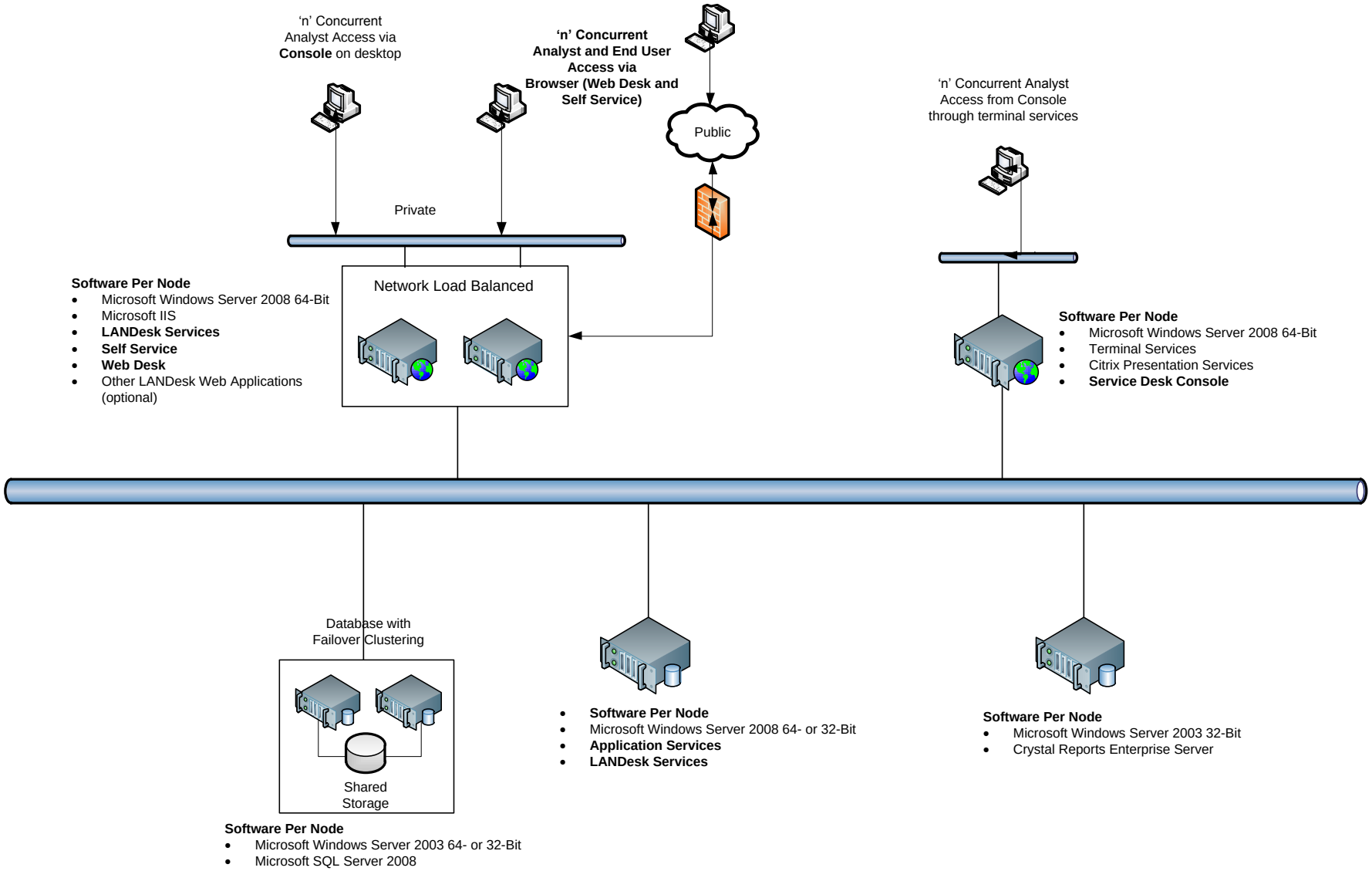
5.6 Medium Scale Deployment

Max. No. of Analysts	100	This is the no. of analyst licences
Max. No. of Concurrent Analysts	100	Assumption is that all analysts work at the same time
Max. No of End Users	10000	This is the no. of end user licences
Max. No. of Concurrent End Users	100	Assume 1% of end users are connected at the same time
Concurrent Analysts using Console desktop	80	Assume 80% of analysts use Console installed on a desktop
Concurrent Analysts using Console via terminal services	20	Assume 20% of analysts use Console via Terminal Services
Concurrent Analysts using Web Desk	100	Assume analysts interchange between Web Desk and Console
No. of incidents, problems,	1000	Maximum of 10 new IPCs created per analysts. (Some

changes (IPC) raised per day		may be raised by end users via Self Service)
No. of incidents, problems, changes (IPC) updated per day	1000	Maximum of 10 IPCs updated per analysts. (Some may be raised by end users via Self Service)

The following deployment model is recommended for this scenario

No. of Database Servers	2	Failover clustering
No. of Web Servers	2	Load Balanced
No. of Terminal Servers	1	Although 1 terminal server will support the estimated concurrent usage defined above, 2 terminal servers load balanced would provide resilience if required.
No. of Application Services Servers	1	No failover clustering
No. of Crystal Report Servers	1	No failover clustering
Database Server – Disk Specification	2 Disk Raid 1	
Database Server – Disk Capacity (Growth)	73GB per year	Assume 0.2 MB of database disk capacity required for each new IPC created. Assume 365 working days per year. 0.2*1000*365 = 73000MB
Knowledge Data – Disk Capacity (Growth)	73GB per year	As above, assuming all IPC data is configured as knowledgeable.
Additional Comments		• Application Services and Crystal Reports are separated onto their own servers. • Only database server is configured as a failover cluster.

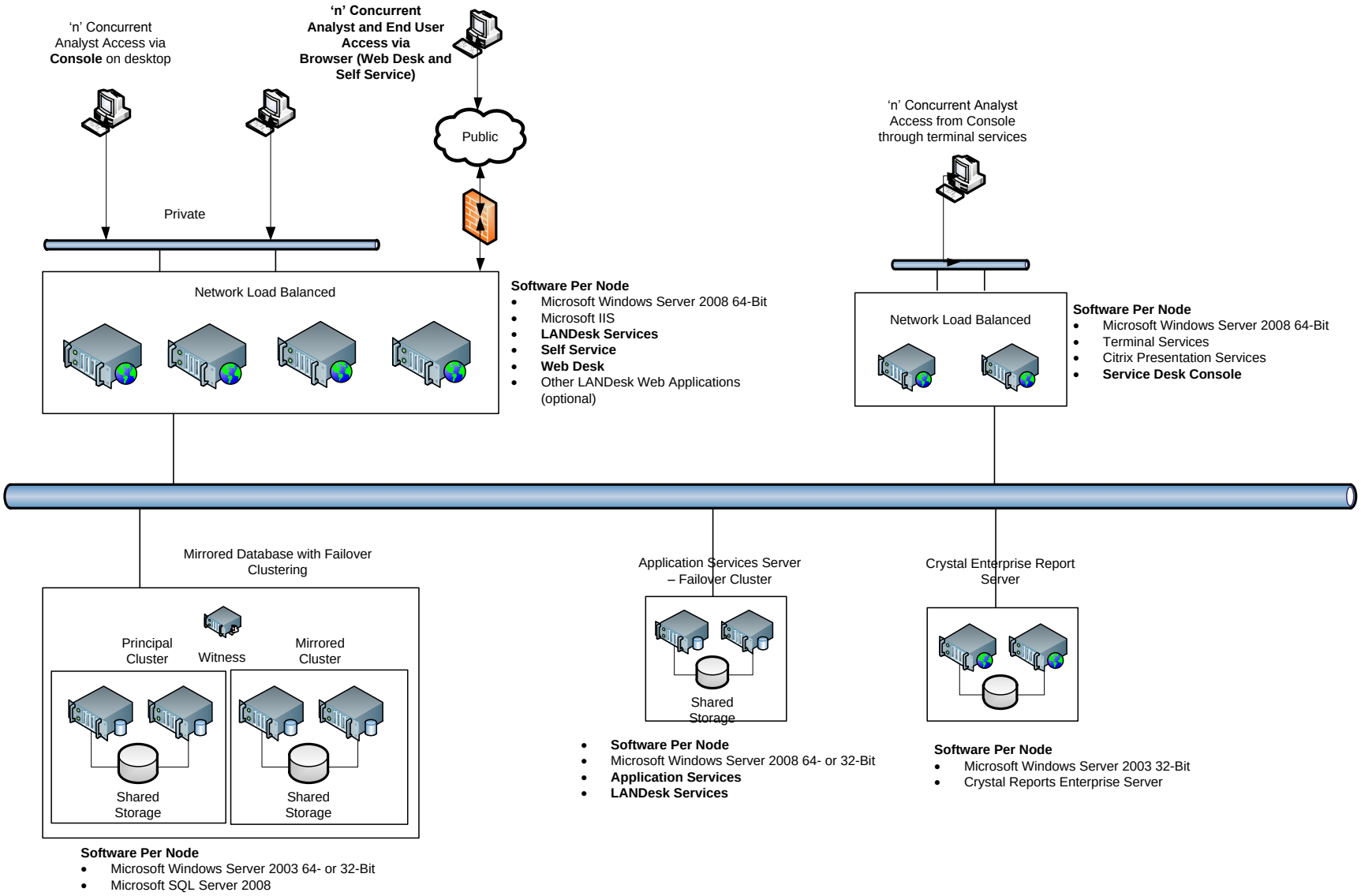

'n' Concurrent Analyst Access via **Console** on desktop
'n' Concurrent Analyst and End User Access via Browser (Web Desk and Self Service)
Public
Private
'n' Concurrent Analyst Access from Console through terminal services
Network Load Balanced
Software Per Node
Microsoft Windows Server 2008 64-Bit
Microsoft IIS
LANDesk Services
Self Service
Web Desk
Other LANDesk Web Applications (optional)
Software Per Node
Microsoft Windows Server 2008 64-Bit
Terminal Services
Citrix Presentation Services
Service Desk Console
Database with Failover Clustering
Shared Storage
Software Per Node
Microsoft Windows Server 2003 64- or 32-Bit
Microsoft SQL Server 2008
Software Per Node
Microsoft Windows Server 2008 64- or 32-Bit
Application Services
LANDesk Services
Software Per Node
Microsoft Windows Server 2003 32-Bit
Crystal Reports Enterprise Server

5.7 Large Scale Deployment

Max. No. of Analysts	500	This is the no. of analyst licences
Max. No. of Concurrent Analysts	500	Assumption is that all analysts work at the same time
Max. No of End Users	50000	This is the no. of end user licences
Max. No. of Concurrent End Users	500	Assume 1% of end users are connected at the same time
Concurrent Analysts using Console desktop	40	Assume a global service with software installed at a central site. 40 Analysts at central site use Console on LAN, all other analysts use Console via terminal services for design and administration or use Web Desk for daily IPC progression.
Concurrent Analysts using Console via terminal services	60	Pool of 60 concurrent terminal server sessions for Console use globally if and when required.
Concurrent Analysts using Web Desk	500	Assume the majority of analysts use Web Desk for their daily work (IPC progression)
No. of incidents, problems, changes (IPC) raised per day	5000	Maximum of 10 new IPCs created per analysts. (Some may be raised by end users via Self Service)
No. of incidents, problems, changes (IPC) updated per day	5000	Maximum of 10 IPCs updated per analysts. (Some may be raised by end users via Self Service)

The following deployment model is recommended for this scenario.

No. of Servers as part of database service	5	Database mirroring with failover clustering (including witness). Based on SQL Server recommendations.
No. of Web Servers	4	Load Balanced
No. of Terminal Servers	2	Load Balanced
No. of Application Services Servers	2	Failover clustering
No. of Crystal Report Servers	2	Failover clustering
Database Server – Disk Specification		4 Disk Raid 1+0 (Data) 2 Disk Raid 1 (Log)
Database Server – Disk Capacity (Growth)	365GB per year	Assume 0.2 MB of database disk capacity required for each new IPC created. Assume 365 working days per year. 0.2*5000*365 = 365000MB
Knowledge Data – Disk Capacity (Growth)	365GB per year	As above, assuming all IPC data is configured as knowledgeable.
Additional Comments		• Application Services and Crystal Reports are separated onto their own servers. • All servers are configured as failover clusters.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Terminal Services
Citrix Presentation Services
Service Desk Console
Mirrored Database with Failover Clustering
Principal Cluster
Witness
Mirrored Cluster
Shared Storage
Shared Storage
Software Per Node
Microsoft Windows Server 2003 64- or 32-Bit
Microsoft SQL Server 2008
Application Services Server – Failover Cluster
Shared Storage
Software Per Node
Microsoft Windows Server 2008 64- or 32-Bit
Application Services
LANDesk Services
Crystal Enterprise Report Server
Software Per Node
Microsoft Windows Server 2003 32-Bit
Crystal Reports Enterprise Server

5.8 The Network

One shared resource used by the Service Desk client applications is the network. Network performance should be taken into account for client access to the Service Desk application, i.e. Console, and Browser clients. Network communication between the servers making up the Service Desk installation is not considered here as it is assumed this communication is controlled within the data centre type environment. The following factors may have an effect on performance of client applications and how they are used.

- Bandwidth including upstream as well as downstream capacity
- Latency
- Quality of Service (QoS) Parameters
- Other applications sharing the same resource
- The number and transaction rates of users and applications on this shared resource

The following figure has been determined based on load testing. The load tests represented 100 concurrent users using the application with a transaction rate which can be expressed in terms of approximately 22,000 new incidents being created (per client application) per 15 hour day. Detailed load test results are available on request if required. The figures provide recommended figures for the whole client user base for a Service Desk installation (i.e. they are not per client figures). These figures should be taken as guidance based on typical usage, but will vary for different application installations. The following figures are recommended for the different client applications:

Application	Recommended Bandwidth	Maximum latency times based on ping times from client to server	Comments
Console installed on desktop	6 MBits/sec – Total for all concurrent connections at the transaction rates described above.	25 ms	These figures should be considered when attempting to use Console in a WAN type environment where bandwidth and specifically latency become an influencing factor. Upstream data rates are equivalent to downstream rates for Console, so an ADSL type connection where upstream rates can be significantly less than downstream rates will have an adverse effect on Console performance.
Console via terminal services	2 MBits/sec - Total for all concurrent connections at the transaction rates described above	200 ms	The figures are the figures for communication between the terminal services client running on the desktop and the terminal server. Communication between the Console running on the terminal server and LANDesk services will be within the data centre.

Web Desk	2 MBits/sec – Total for all concurrent connections at the transaction rates described above.	300 ms	
Self Service	2 MBits/sec – Total for all concurrent connections at the transaction rates described above.	200 ms	

5.9 Server to Server Communications

We recommend that the server components of the Service Desk application are located and maintained within a server room or data centre environment. In this environment, it is assumed that networking between servers is isolated from the client network described above.

5.10 Environmental and Business Considerations

The above scenarios are examples of typical deployments; however, variations from above will occur. Specifically, the following variations may affect the deployment model.

5.10.1 Globally Distributed Workforce / Remote Access Workforce

We recommend that one deployment is used to deliver LANDesk Service Desk to all analysts and end users. This typically will be deployed in a data centre or at one geographical location within an organisation (e.g. the UK office). The only software installed 'remotely' being the LANDesk Console application on the analysts desktop. In this model, all data is held centrally on one database. It removes the need to implement different Service Desk systems running in different locations.

The Service Desk application provides a number of different interfaces to allow this to be the correct deployment including terminal services support for Console, and browser interfaces for analysts (Web Desk and Mobile Portal) and end users (Self Service).

Data partitioning features provided by the application can be used to provide a level of partitioning of data for different groups of end users and analysts if required again removing the need for multiple deployments in many cases.

5.10.2 Terminal Services Access

The number of analysts who use the Console via the terminal services server particularly in a global environment where this method is the preferred approach should be considered carefully. As a maximum of 40 users per terminal server is recommended (industry recommendations), then the more concurrent terminal server sessions required will increase the number of terminal servers required. Additionally, there is an inherent cost on terminal server/Citrix client licences required to deliver this solution.

In a globally distributed workforce environment using one deployment of Service Desk as described above, we recommend that the majority of analysts use the browser based Web Desk application for their primary daily activities wherever possible.

5.10.3 The Transaction Rate and IPC Volume

The number of IPCs created per day described in the previous scenarios estimate a high volume per day so that conservative estimates can be given. These volumes are primarily to determine data storage capacity (i.e. disk size) rather than the scale of the deployment (i.e. the no. of servers). The scale of the deployment is primarily determined by concurrent usage of analysts and end users using the client application software (Console, Web Desk and Self Service).

5.10.4 Virtualisation

The recommended server specifications provided previously in this document are based on physical hardware. Virtualisation technologies are supported as detailed in the supported platforms documentation. If a physical server is replaced by a virtual server the following recommendations should be taken:

- 8GB or 4GB RAM per virtual server (as per physical server recommendations)
- 2 virtual CPUs per virtual server

From experience, the database and terminal servers are typically deployed as physical servers, although this is not a requirement. There are many factors that would influence this decision by a customer, including factors such as:

- Physical servers are not competing with any resources that they may do in a virtual environment so may provide better performance and provide more capacity
- These servers may typically be shared with other applications, i.e. the DB server is used for many applications and so resources become more of an issue.

6 Appendices

6.1 Ports

The following ports are used by application software components. The communication mechanism (protocol) used by each individual component is described previously in this document.

Application	TCP Port	Description
Internet		
HTTP	80	World Wide Web HTTP
HTTPS	443	HTTP protocol over SSL
Email		
SMTP	25	Simple Mail Transfer Protocol
IMAP4	143	Internet Message Access Protocol 4
Databases		
Microsoft SQL Server	1433	Default Microsoft SQL Server Port
Oracle	1521	Default Oracle Port
LANDesk LDMS		
landesk-cba	38037	
landesk-cba	38292	
LDAP		
LDAP	389	Lightweight Directory Access Protocol
LDAP	636	636
Terminal Services		
RDP		

6.2 Exceptions and Variations

6.2.1 Database

All the above specifications have used Microsoft SQL Server as the RDBMS. However, all the above specifications are valid using Oracle as the RDBMS.

6.2.2 Application Services Server

The recommended operating system platform for the application services server is 64-bit. However, there are limitations when running in this mode. These are:

- Use of the Microsoft Access and Microsoft Excel data connectors will not work when the Service Desk application is running as a 64-bit native application if the version of Office used is one prior to Office 2010. This is because there are no native 64-bit connectors provided by Microsoft to connect to these data sources. This can be resolved by ensuring that the Service Desk application runs as a 32-bit application. This can be done in one of 2 ways; either by installing a 32-bit operating system on the application services server, or run LANDesk Services (TPS) as a 32-bit application on a 64-bit platform. This can be done by configuring the application pool running the LANDesk Services (TPS) so that it runs as a 32-bit application. This limitation will be removed with the introduction of Office 2010 which does provide native 64-bit support.
- If Office 2010 is used, then this is no longer a limitation and the application services server can be run on a 64-bit platform.