Zenator® Systems

ASSET VERIFICATION MANAGEMENT SYSTEM

Hardware & Software Technical Information Completion Management Software

Houston, Rio de Janeiro, Belfast, Norwich and Perth
April 2017

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Introduction

This document contains Technical Information for *Zenator Systems* dealing with the following topics:

- Hardware Recommendations
- Software Requirements
- Additional Information (Backups, Security, Auditing, etc)

It has been produced for customers that are ready to implement *Zenator Systems* and assumes the customer / project is preparing the necessary hardware (servers and desktop PCs) in readiness for the installation of *Zenator*.

The references made to *Zenator* in this document are based on the following deployment options:

- **Zenator Live!**, the Falcon-hosted solution from Belfast, Northern Ireland
- **Zenator Systems**, the Customer-hosted, Installed solution

Zenator Systems and **Zenator Live!** are hereinafter referred to as "**Zenator**". Global Falcon Americas, Inc. (GFA), is the Houston-based, US affiliate of Falcon Global Limited (FGL), hereinafter "Falcon".

The Software Products Currently Available

The following is a reminder of the individual products that make up *Zenator* and assumes the current version 3.3.5.0.

- *Zenator Systems*, comprising
    - *Check*
    - *Launch*
    - *Allocator*
    - *Reports Plus*
    - *Reporting Dashboard*
    - *Walkdown Capture*
    - *Administrator*

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Zenator Check

Zenator Check is the primary module that makes up *Zenator*. *Zenator Check* allows for a user friendly and controlled way to control, track, manage and report on the entire project.

Rev 2.2

Zenator Launch

Zenator Launch is an import tool which allows a variety of data to be imported into *Zenator* in a very controlled manner from Microsoft Excel files.   The categories of data that can be imported are as follows:

- Tagged Items
- Punch List Items
- Certificates
- MOCs
- Documents (links to external documents)
- Punch List Faults
- Isolations
- ITRs
- Templates (ITR, Certificate, etc Document Templates)
- Resources
- Route (planning information)
- Tag Type Matrix
- Tagged Items Updates
- Test Packs, Instrument Loops & Electrical Circuits (TLCB)

Rev 2.2

Zenator Allocator

Zenator Allocator processes all completed documents (AITR Checksheets, BITR Checksheets, Certificates for example) that originated from *Zenator*.   All generated documents within *Zenator* contain bar codes which allows for the easy processing of the completed documents in electronic form back into *Zenator*.

Global Falcon - Zenator Allocator - 3.3.5.0 - 01 Apr 2017		
File Management Help		
Process Documents		
Scan History		User Name: cbell
Name	User Activity	Value
MARK	Email Settings	TRUE
MARK	ENDORSED	TRUE
USE T		FALSE
MARK MANHOURS PLANNED EQUAL ACTUAL PLANNED		FALSE
BLANK PAGE CONTINUATION FROM PREV DOCUMENT		TRUE
PLI SET DATE CLEARED		TRUE
PLI SET DATE ACCEPTED		TRUE
CHANGE MANAGEMENT SET DATE ACCEPTED		FALSE
LOCATION OF PROCESSED DOCUMENTS		E:\Zenator\Alan-Demo\Allocator\Processed
LOCATION OF FAILED DOCUMENTS		E:\Zenator\Alan-Demo\Allocator\Failed\
RETAIN AUDIT HISTORY DAYS SUCCESSFUL		10
RETAIN AUDIT HISTORY DAYS FAIL		10
PROCESSING INTERVAL MINUTES		20

Rev 2.2

Zenator Reports Plus

Zenator Reports Plus is a comprehensive reporting tool which allows the user to produce a wide variety of Management, Graphical and Detailed reports covering all aspects of the information within *Zenator*.

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Zenator Reporting Dashboard

Zenator Reporting Dashboard is a Browser based reporting tool allowing important key performance indicators to be reviewed using any PC, Portable or mobile device (Smart Phone, Tablet, etc) with an internet connection.
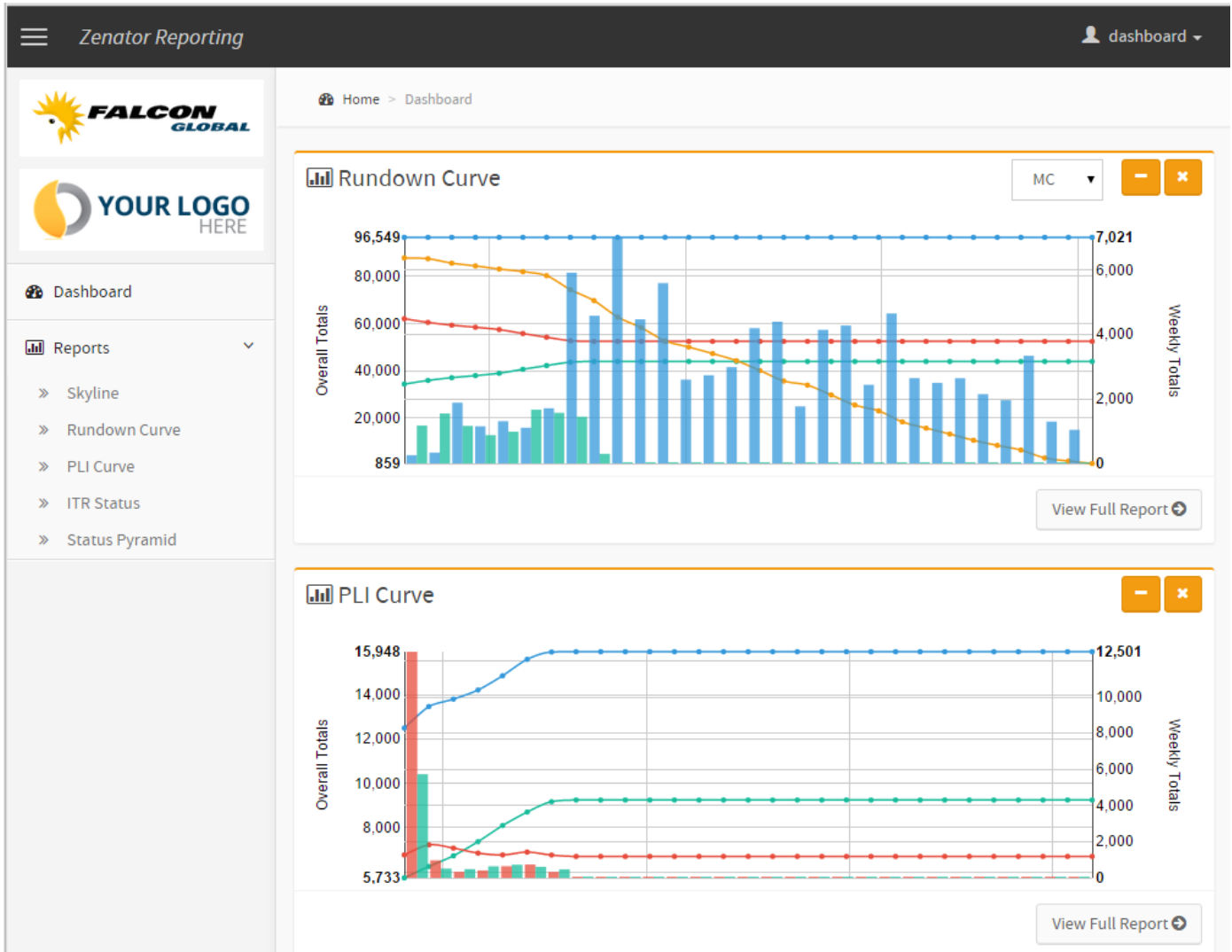
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Zenator Walkdown Capture

Zenator Walkdown Capture is a Microsoft Windows Tablet module which allows for the electronic capture of Punch List Item data and images during walkdown inspections. Punch List Items can be accurately captured quickly and efficiently in the field.   Server side functionality within Zenator *Check* controls the preparation and processing of the data to and from the Tablet device.
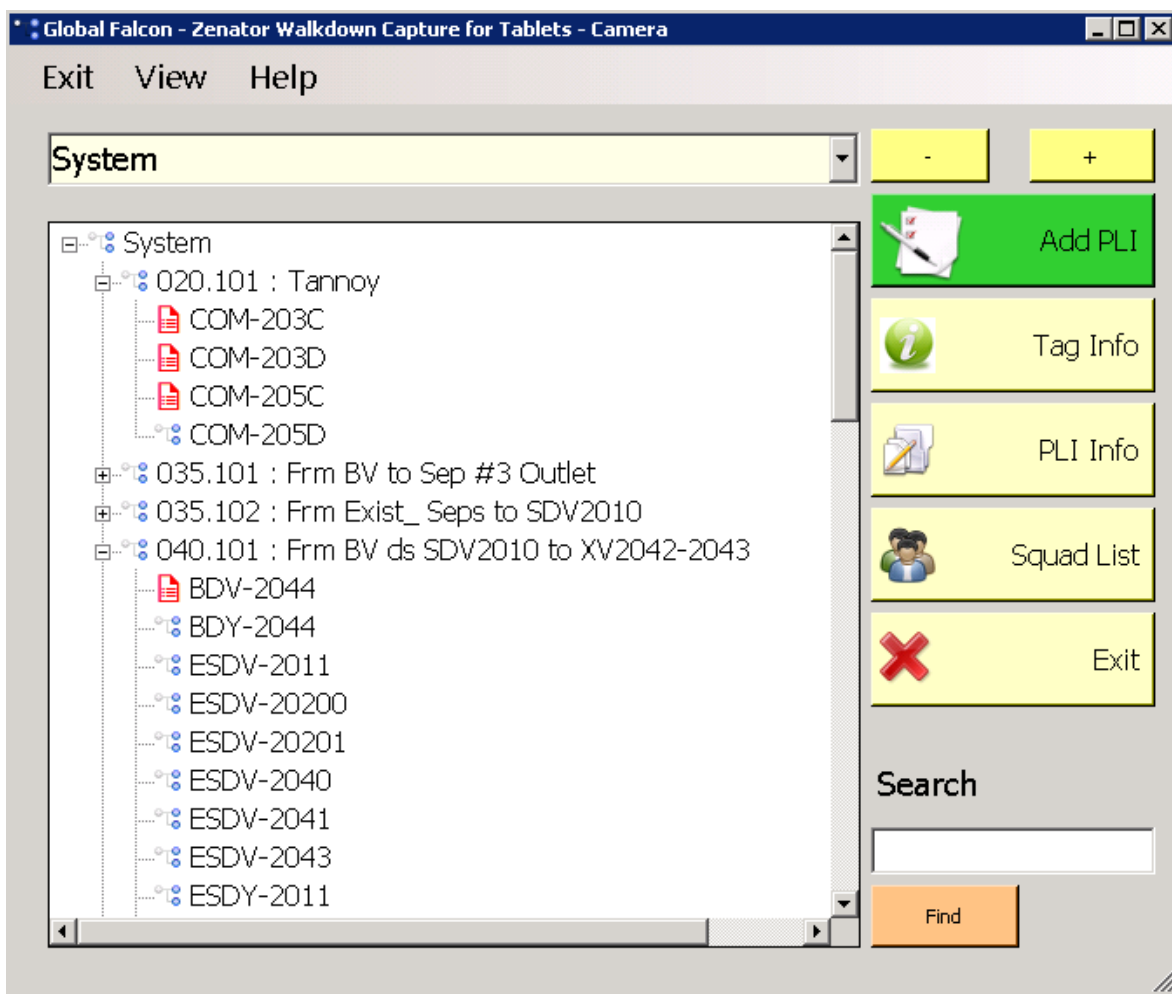
Zenator Administrator

Zenator Administrator is provided to allow the administrative tasks within *Zenator* to be controlled under a menu driven utility. *Zenator Administrator* allows the following tasks to be easily controlled:

- Project Database creation
- Project Database patching (following the release of new *Zenator* upgrade versions)
- Creation of *Zenator* Administrators
- Creation of Data Connections (referred to as Data Sources within *Zenator*)

Hardware & Software Requirements

The following are generalized requirements for all customers / projects.   These should be discussed further with Falcon to finalize specific requirements for the customer / project based on the estimated size of the project(s) and the number of concurrent users expected.

1.1 Recommended Server Environments

It is recommended that a customer maintains as a minimum separate environments for the following:

- Production
- Test / Training

This will ensure that testing of new *Zenator* releases and training of users will have no impact on the production environment.

Some customers also opt to separate out the Test and Training into separate environments but this is not a specific requirement from Falcon.

1.2 Technical Information – Servers and Workstations

The following sections deal with the technical information for Servers and workstations which will support the running of *Zenator*.

1.2a. Which Infrastructure Items are impacted by *Zenator*?

Existing infrastructure items which are affected or potentially affected by the installation of *Zenator* are:

- File Server
- Database Server
- Citrix Server
- Any workstations where *Zenator* is installed
- Printers (Network or Local)
- Scanners (Network or Local)
- Network appliances
- Switches
- Routers
- Firewalls

1.2b. Which Infrastructure Items will be used by *Zenator*?

Currently *Zenator* Systems utilizes the following infrastructure items:

- File Server
- Database Server
- Citrix Server
- Any workstations where *Zenator* is installed

- Printers (Network or Local)
- Scanners (Network or Local)
- Network appliances
- Switches
- Routers
- Firewalls

1.2c. What is the minimum level of "Permission" required for the installation of *Zenator*?

Permissions are as follows:

- Domain administrator to install
- Domain user to operate

1.3 Hardware Information – Servers and Workstations

1.3a. Hardware Requirements for Production Servers.

Production Server Hardware Minimum Recommendations

- File / Application / Citrix Server
  - 3 x 1 TB SCSI Hard Disk Drives
  - Raid 5
  - Xeon Processors 64 bit
  - Redundant PSU
  - UPS
  - Cloud/Online Backup (available from FGL)
  - 16 GB RAM

- Database (SQL) Server
  - 3 x 1 TB SCSI Hard Disk Drives
  - Raid 5
  - Xeon Processors 64 bit
  - Redundant PSU
  - UPS
  - Cloud/Online Backup (available from FGL)
  - 16 GB RAM

Please note the deployment of the *Zenator* Dashboard product also requires the use of a Web Server.   This can be deployed on a dedicated and separate Web Server or as part of the above Application / Citrix Server according to the customers own IT policies and requirements.

1.3b. Hardware Requirements for Workstations.

Workstation Hardware Minimum Recommendations

- Intel i5 processor 64 bit
- 4 GB RAM
- 500 GB hard drive
- 22 inch TFT monitor
- Keyboard
- Mouse
- Network card
- No sound required

1.3c. Hardware Requirements for Test / Training Servers.

Falcon do not require hardware requirements for Test / Training servers to be identical to the Production environment. The SQL Server, File Storage and Application / Citrix can all be installed on a single server.

The specification of this server can also be reduced and the following would be a recommended minimum requirement:

- Single Server supporting SQL Server / File / Application / Citrix
  - o 1 TB SCSI Hard Disk Drives
  - o Xeon Processors
  - o 8 GB RAM

The exact specification of this server / environment will depend on the customer / project requirements for its use.

It could be an identical environment to production so that testing etc. can exactly mimic the production environment conditions.

It is also equally acceptable that a scaled down specification is used as per the above recommended minimum above.

1.4 Hardware Information – Examples For Specific Supported User Numbers.

Application / Citrix server specific hardware examples against supported concurrent user counts can be found in the table below:

Supported Users	Processor	Memory	Hard Disk Type	Operating System
30 Users	Quad Core Intel Xeon 2.67Ghx	16GB	SCSI Hard Disk Drives	Windows 2008 R2 Windows 2012 R2
30 – 50 Users	8 x Core Intel Xeon 2.67Ghx	32 – 64GB	SCSI / SAS Hard Disk Drives	Windows 2008 R2

				Windows 2012 R2
50 – 100 Users	16 x Core Intel Xeon 2.67Ghx	64GB	15000 rpm SAS Hard Disk Drives	Windows 2008 R2 Windows 2012 R2

For greater numbers of users Citrix Application Servers can be supported through a Citrix Farm containing multiple servers from the above with load balancing features.

1.5 Software Information – Servers and Workstations

1.5a. Software Requirements for Production / Test / Training Servers.

Server Software requirements for all environments (Production, Test / Training) are:

- Application / Citrix Server
    - o Microsoft Office 2007 through to Office 2013
    - o Inlite Clearimage PDK Version 7 (supplied by Falcon)
    - o Barcode Font 59 (Free3of9) (supplied by Falcon)
    - o Adobe Reader (most current version)
    - o Any other Viewer as required by the Customer / Project
    - o .NET Framework Version 4.5
- SQL Server
    - o Microsoft SQL Server 2008
    - o Microsoft SQL Server 2012

As indicated above the SQL Server Instance can also reside on the Application Server / File Server for the Test / Training Environment.

Software for the Operating System, SQL Server and MS Office should be 64 bit.

1.5b. Software Requirements for Workstations.

Workstation Software Requirements if accessing *Zenator* via Citrix:

- Microsoft Windows 7 Professional, Microsoft Windows 8.1 Pro or Microsoft Windows 10 Pro
- Microsoft Internet Explorer Version 9, Version 10 and Version 11
- Microsoft Edge (if using Windows 10)
- Appropriate Citrix client add on

Workstation Software Requirements if accessing *Zenator* via direct installation on Workstation:

- Microsoft Windows 7 Professional, Microsoft Windows 8.1 Pro or Microsoft Windows 10 Pro
- Microsoft Office 2007 through to Office 2013

- Inlite Clearimage PDK Version 7 (only required for Workstations using *Zenator Allocator*). Please note for a typical contract Falcon supply one 3rd party license for Clearimage assuming a centralized Citrix deployment.   A deployment via installation on Workstations may require additional Clearimage licenses to be purchased for each PC processing scanned documents via *Zenator Allocator*.
- Barcode Font 59 (Free3of9)
- Adobe Reader (most current version)
- Any other Viewers as required by the Customer / Project
- .NET Framework Version 4.5
- Software for the Operating System and MS Office should be 64 bit (if 64bit hardware is utilized).

Additional Information

The following is additional information to assist the customer and their IT department to better understand *Zenator*. This is not an exhaustive list and any further questions or queries that arise should be directed to Falcon.

2.1 Use of Virtual Servers

Zenator can be installed on Virtual Servers.

If using *Zenator* Live! (FGL Hosted Solution):

- VMWARE and Citrix XenApp Browser plugins

If using Customers Hosted Solution:

- VMWARE

Software Requirements for *Zenator* within the Virtual Server are as per sections 1.5a.

2.2 Database Information

The *Zenator* Database (SQL Server) can be installed on Virtual Servers.

Currently *Zenator* Systems can be deployed against the following Microsoft SQL Server Editions:

- Microsoft SQL Server Enterprise Edition
- Microsoft SQL Server Standard Edition
- Microsoft SQL Server Express Edition

Currently *Zenator* Systems can be deployed against the following Microsoft SQL Server versions:

- Microsoft SQL Server 2008

The decision on the correct version of SQL Server needs to be assessed based on the planned role out of *Zenator*. Is it just supporting a single project or is it supporting a number of projects on the same SQL Server. This can be discussed further with Falcon.

2.3 Database Size

Capacity is directed related to the number of Equipment Items (Tags) within each Project. We would however recommend a minimum starting capacity of 1GB.

Estimated growth of 1GB per 50000 Tags of Database Storage.   Note this excludes File Storage requirements for the storage of documents (MS Word, PDF, etc).

2.4 Intensive Tasks

There are a number of areas within *Zenator* and tasks that the user can perform which have a medium to high intensity. These are:

- *Zenator* Launch (Tag Import) – load of Engineering Data (Tagged Items).
- *Zenator* Launch (PLI Import) – load of Punch List Items.
- *Zenator* Check (ITR Wizard) – generation of ITR Test Documents against the Project Data.
- *Zenator* ReportsPlus (Reporting Table Update) – the update process that copies live data into the reporting tables.
- *Zenator Allocator* (Scan Document Processing) – the processing of scanned completed *Zenator* documents (ITR Checksheets, Certificates, etc).

FGL does not have specific Maximum / Average numbers of Requisitions information available but within training does offer recommendations on Good Work Practices / Procedures to reduce the effect of these more intensive tasks on users and the infrastructure.

2.5 Deployment of *Zenator*

A customer can choose from two primary methods for *Zenator* deployment as follows:

- *Zenator* Live – *Zenator* is hosted by Falcon Global on dedicated servers accessed using a Citrix deployment. Servers are hosted in a dedicated security data centre with detailed security measures, backup and disaster recovery procedures.   A *Zenator* Live deployment can be available within 2 weeks from point of confirmation.

- Customer Hosted – *Zenator* is hosted on the customer's own corporate network. Within a LAN environment *Zenator* can be installed on the local Desktop and run as a Client / Server application connecting to the hosted *Zenator* SQL Server.   Within a WAN (or LAN) environment *Zenator* can be accessed using a Citrix deployment. Falcon will work with a customer / project to define the appropriate server hardware & software requirements.

For a Customer Hosted Deployment this can be further divided down using the following access methods:

- Citrix (preferred)
- Terminal Server
- Client / Server – the *Zenator* Application (Check, Launch, *Allocator*, ReportsPlus & CheckSynch) are installed onto the Workstation with the databases on the SQL Server and generated documents on a centralized Server and Storage Area.

Please note that a Client / Server deployment is only possible for projects where the Servers and Workstation are all located on a LAN (Local Area Network).

2.6 Protocols and Ports

Depends on the application architecture / deployment method.

- Citrix XenApp
- RDP
- SQL Server Ports
- PPTP/VPN
- File/printer sharing (LAN/WAN)

Port information is as follows.

- TCP – Port 443 – SSL
- ICA Port 1494, 2598 – SSL
- PPTP/VPN Port 1723
- GRE Tunneling

2.7 Production Environment Operational Routines

There will be a number of operational routines which will need to be set-up / configured / monitored by the SQL DBA on the Production Environment as follows:

- Database Index Rebuild (recommended for weekly execution).
- Database Transaction Log Purge (recommended for weekly execution).
- *Zenator* Audit Trail Purge (recommended for weekly execution to maintain 90 – 120 days Auditing Information).
- *Zenator* User Activity Purge (recommended for weekly execution to maintain 90 – 120 days Auditing Information).

Falcon recommends the use of the Windows Scheduler on the SQL Server to automate these key routines. These maintenance routines will be supplied as part of the installation process.

2.8 Server Backup Recommendations

The backup of the *Zenator* SQL Database Server, Application / Citrix Server and Document Storage Area should be backed up on a daily basis following the standard procedure within the organization.

Please note that in the event of a Disaster Recovery situation the restore of the SQL Database and Document Storage Area should go together to ensure both are in synch with each other.

Falcon Technical Support is available to discuss further if the customer / project's IT team require further information.

2.9 *Zenator* Security and Auditing Logs

The following sections deal with *Zenator* and System security related items covering also auditing information.

2.9a. Authentication Modes

Currently *Zenator* Systems uses the following Authentication Modes:

- Windows / Active Directory Group Authentication (recommended)
- SQL Authentication

2.9b. *Zenator* User Profiles

Zenator utilizes user profiles (created and maintained by *Zenator*) to control certain aspects of the *Zenator* User Interface.   The user is allowed to set certain preferences on how the User Interface within *Zenator* behaves.   These profiles are stored within the Windows User Application Data area of either the Citrix Server (in the case of a Citrix deployment) or the users Workstation (in the case of a Client / Server deployment).

2.9c. *Zenator* Auditing Mechanisms

There are a number of Access & Audit Logs maintain by *Zenator* as follows:

- Windows Event Log.   *Zenator* applications all submit serious / major issues to this log. This will be stored on the Server / Workstation where the *Zenator* application is executed from. Once submitted this is maintained by the Windows Operating System.

- *Zenator* User Activity. *Zenator* applications all submit and maintain user / application activity (which user started a *Zenator* application and when they exited that application).   This will be stored within the Project database and is maintained at the discretion of the Project Team / SQL DBA (see section 2.7).

- *Zenator* Audit Trail. The Database maintains User Auditing information to the individual field level (old and new value) for Inserting, Update and Deletion. This will be stored within the Project database and is maintained at the discretion of the Project Team / SQL DBA (see section 2.7).   This can be accessed and reviewed from within the *Zenator* Check application for users with the correct access permissions.

2.9d. Data Integrity and Confidentiality Protection

Zenator maintains the integrity and confidentiality of the project data as follows:

- Standard SQL Referential Integrity methods are employed within the Database structure and design with the database structure normalized to the 3rd normal form.

- No SELECT, INSERT, UPDATE or DELETE permissions are granted directly to any user or group of users.   All data viewing, insertion, modification and deletion is controlled through a Database Stored Procedure access layer. Only EXECUTE privileges are granted to this Database Stored Procedure access layer.   This ensures users cannot utilize 3rd party tools to access data within the database.

- Further data protection and data confidentially is maintained via an Application Security Layer. The *Zenator* Administrator controls a detailed level of permissions to all options within *Zenator*. This layer provides a further ability to grant View, Update, Insert and Delete to user groups down to a Node level (Data Type).
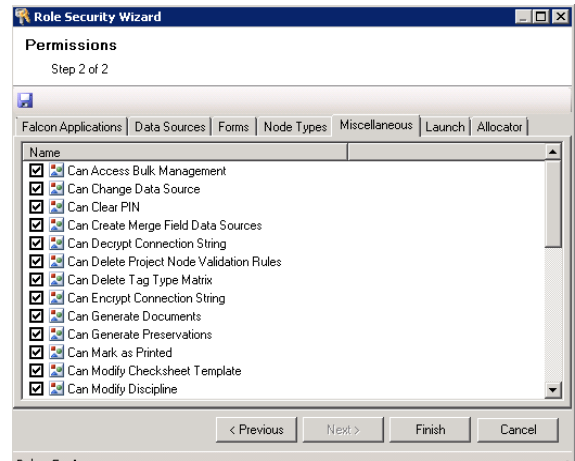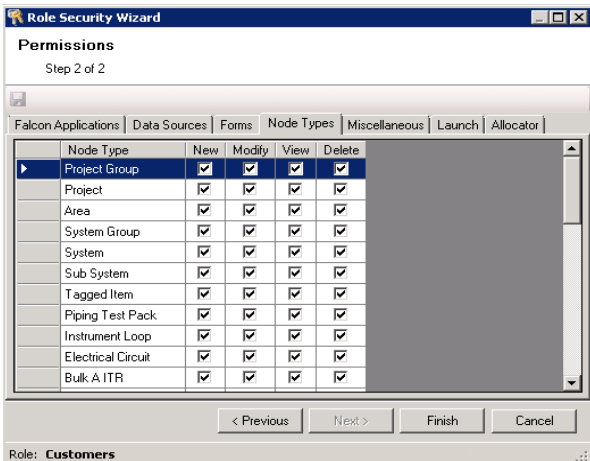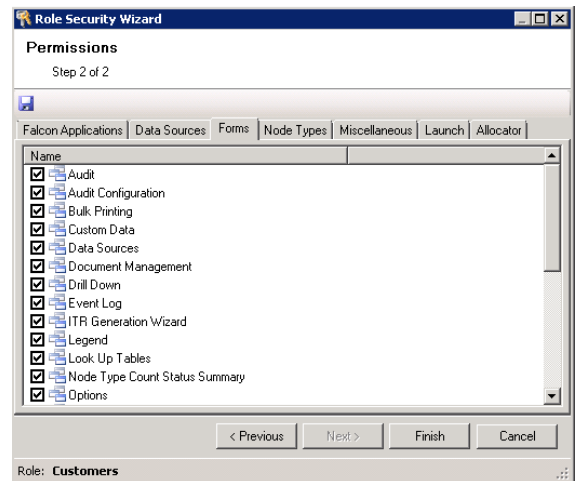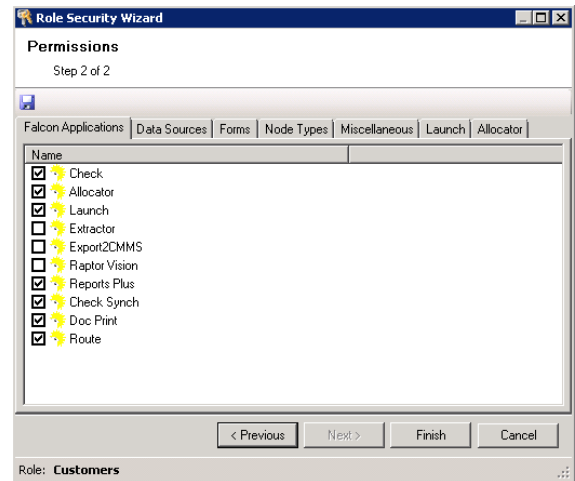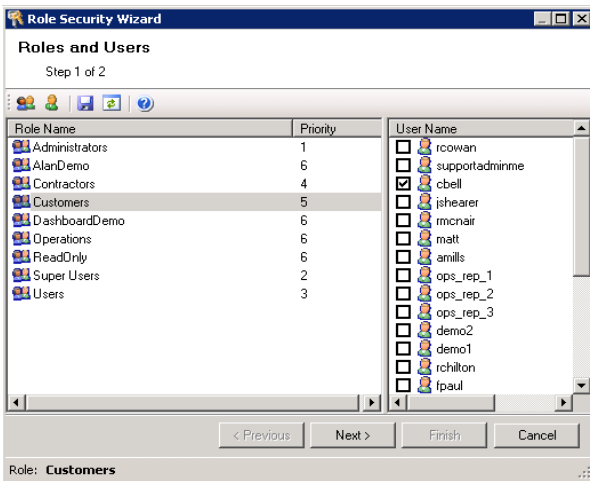
Role Security Wizard

Permissions

Step 2 of 2

Tabs: Falcon Applications | Data Sources | Forms | Node Types | Miscellaneous | **Launch** | Allocator

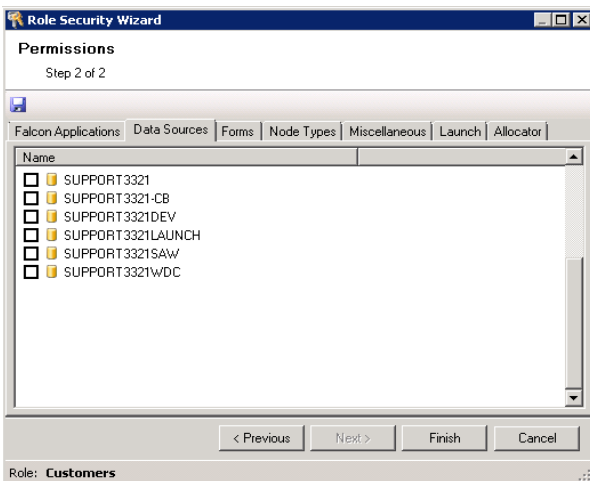| Name	
☑ Can Change Configuration Settings	
☑ Can Access Management - Templates - Template W...	
☑ Can Access Management - Templates - Open Existing	
☑ Can Access Management - Import History	
☑ Can Access Management - Import Detail Report	
☑ Can Access Management - User Activity	
☑ Can Access Import - Tags	
☑ Can Access Import - Tag Type Matrix	
☑ Can Access Import - Punch List Items	
☑ Can Access Import - Faults	
☑ Can Access Import - Resources	
☑ Can Access Import - Associated Documents	
☑ Can Access Import - Tag Updates	

< Previous | Next > | Finish | Cancel

Role: **Customers**

Role Security Wizard

Permissions

Step 2 of 2

Tabs: Falcon Applications | Data Sources | Forms | Node Types | Miscellaneous | Launch | **Allocator**

| Name	
☑ Can Change Configuration Settings	
☑ Can Access Management - Process Documents - All...	
☑ Can Access Management - Process Documents - Ed...	
☑ Can Access Management - Scan History	
☑ Can Access Management - User Activity	
☑ Can Access Management - Email Settings	
☑ Can Access Management - Delete History	

< Previous | Next > | Finish | Cancel

Role: **Customers**
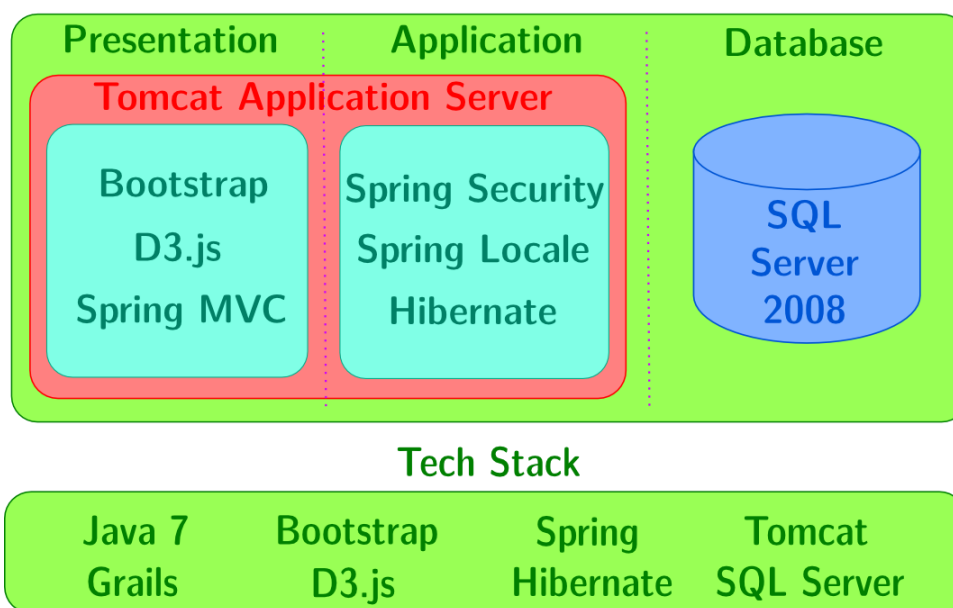
3.0 *Zenator* Application Architecture

The following is a summary of the *Zenator* Application Architecture for *Zenator* Check, *Zenator* Launch, *Zenator Allocator* and *Zenator Reports Plus*. More details can be made available on request.

Zenator Architecture
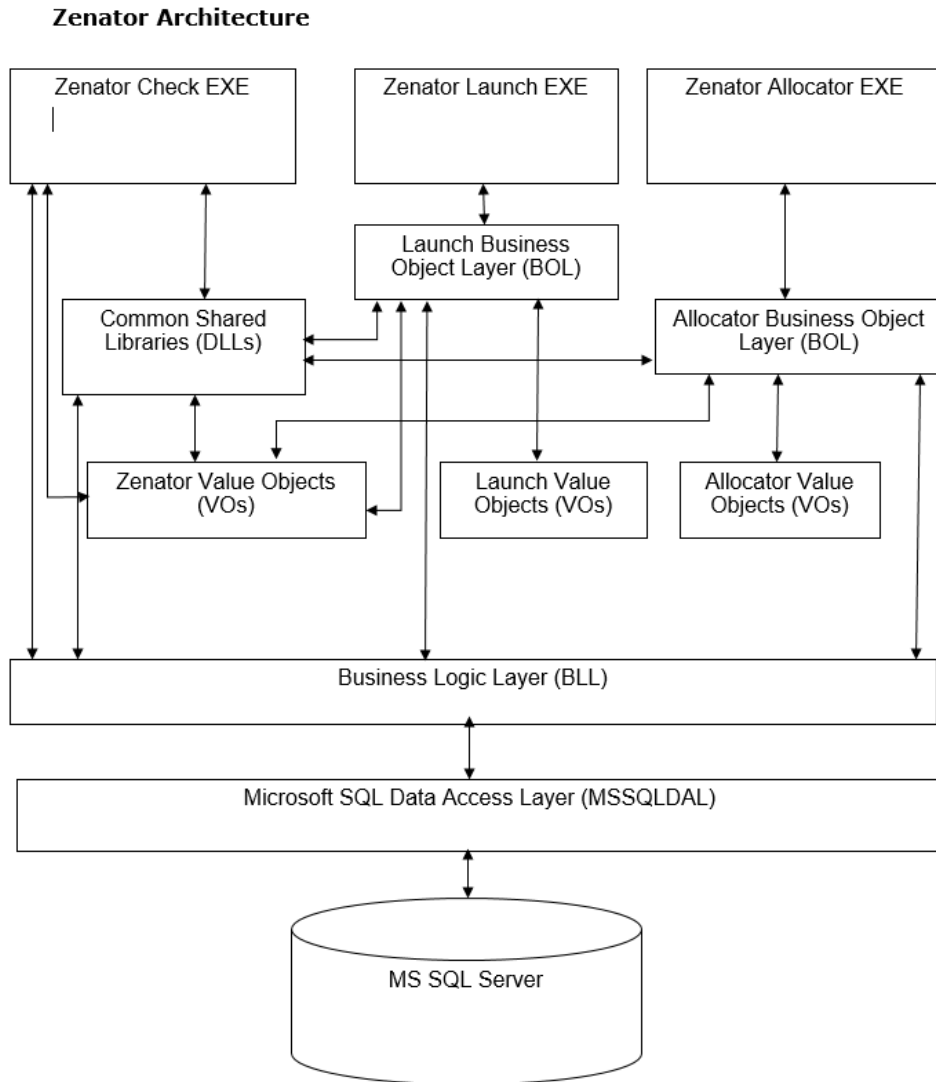
3.1 *Zenator* Dashboard Architecture

The following is a summary of the *Zenator* Application Architecture for *Zenator* Dashboard. More details can be made available on request.

Architecture Diagram

Presentation	Application	Database
Tomcat Application Server		
Bootstrap D3.js Spring MVC	Spring Security Spring Locale Hibernate	SQL Server 2008

Tech Stack

Java 7	Bootstrap	Spring	Tomcat
Grails	D3.js	Hibernate	SQL Server

Apache Tomcat is an open source web server and servlet container developed by the Apache Software Foundation (ASF). Tomcat implements the Java Servlet and the JavaServer Pages (JSP) specifications, and provides a "pure Java" HTTP web server environment for Java code to run in.

Hibernate is an object-relational mapping (ORM) library for the Java language, providing a framework for mapping an object-oriented domain model to a traditional relational database. Hibernate solves object-relational impedance mismatch problems by replacing direct persistence-related database accesses with high-level object handling functions.

Bootstrap is front-end framework for creating websites and web applications. It contains HTML and CSS-based design templates for typography, forms, buttons, navigation and other interface components.

The Spring Framework is an application framework and inversion of control container for the Java platform.

- Spring Security is a Java/Java EE framework that provides authentication, authorization and other security features for enterprise applications.
- Spring MVC: Springs implementation of the Model View Controller design patter.

D3.js (Data-Driven Documents) is a JavaScript library that uses digital data to drive the creation and control of dynamic and interactive graphical forms, which run in web browsers. It is a tool for data visualization making use of the widely implemented Scalable Vector Graphics (SVG), JavaScript, HTML5, and Cascading Style Sheets (CSS3) standards.

Grails is a web application framework based on the Java platform. It offers a rapid application development environment through the coding by convention paradigm whilst providing the flexibility to incorporate Java API's that operate outside of the application framework.

3.2 *Zenator* Deployment Architecture

The following are examples of potential deployment architecture.   Falcon will work with a customer / project to recommend and agree the best possible technical architecture for the deployment of *Zenator*.

3.2a Client / Server Architecture

For small to medium size projects where all resources and personnel reside within a LAN, *Zenator* can be installed and be run from a local drive of the user's workstation.   A single server on the network will provide a SQL database, a document store and will run important services.   Note the document store can also be placed onto a network storage device.
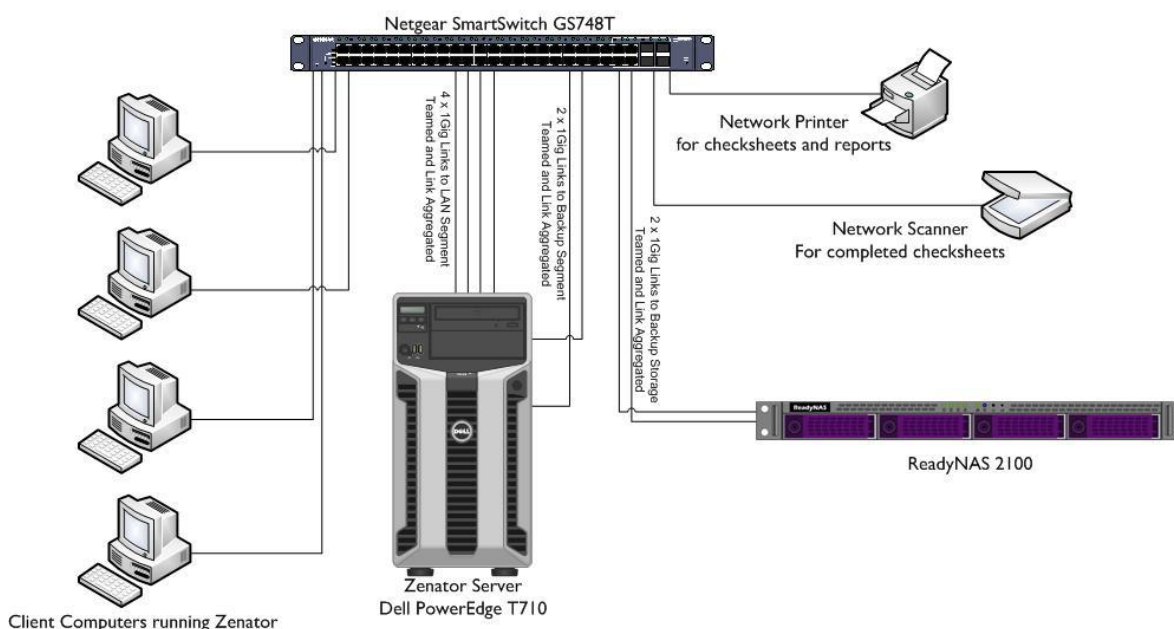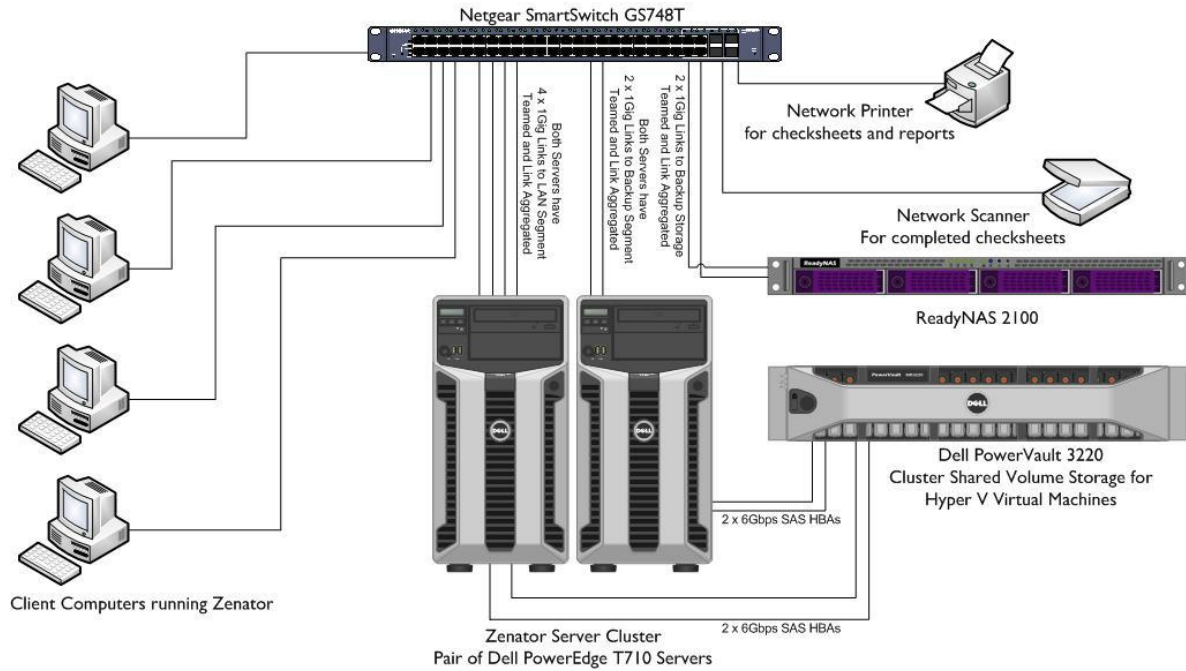

As more projects are added to *Zenator* the above architecture can be expanded to include further SQL Servers.

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Netgear SmartSwitch GS748T

Both Servers have
4 x 1Gig Links to LAN Segment
Teamed and Link Aggregated

Both Servers have
2 x 1Gig Links to Backup Segment
Teamed and Link Aggregated

2 x 1Gig Links to Backup Storage
Teamed and Link Aggregated

Network Printer
for checksheets and reports

Network Scanner
For completed checksheets

ReadyNAS 2100

Dell PowerVault 3220
Cluster Shared Volume Storage for
Hyper V Virtual Machines

2 x 6Gbps SAS HBAs

2 x 6Gbps SAS HBAs

Client Computers running Zenator

Zenator Server Cluster
Pair of Dell PowerEdge T710 Servers

3.2b Citrix Architecture

For remote access the recommended deployment architecture is via a Citrix Deployment. In this case the Citrix is used to provide access to users in remote locations.