

AXIELL COLLECTIONS
TECHNICAL SPECIFICATIONS & ARCHITECTURE



1 Infrastructure specifications

The following is a compilation of important technical information for the Axiell Collections product suite. Please read through these topics carefully as they contain information that will affect the implementation and success of your project. This information is subject to change as Axiell releases new versions of its products. In general, Axiell Collections runs on all Windows platforms which are currently maintained by Microsoft including Windows 2012R2 Server and later, Windows 8 and Windows 10. As a prerequisite for use, please install the most recent versions of the Windows Operating System, Microsoft Components and Features.

The Axiell Collections system may be installed on separate servers for all main components (separation of concerns), or on one (or more) combined servers. The recommended component implementation will depend on expected server load. Typically, the installed servers are virtualized. For more information on server specifications, please consult the Microsoft website.

1.1 MS SQL Server

Depending on the products implemented and your preferred configurations, technical requirements may vary. In addition, please consult the Microsoft web site for the minimum and recommended system requirements per MS operating system. Minimum and recommended system requirements for a server running a MS SQL Server Axiell Database are listed below. You may use an existing SQL Server installation in that case the recommended listed requirements are minimum and depending on the use of your other databases.

Part	Minimum system requirements	Recommended minimum requirements
Processor	4 (v)CPU	8 (v)CPU
RAM	8 GB	16 GB
Network card	1 Gbit	10 Gbit
Database Version	SQL Server (Express) 2014 or later depending on features used like trigger services	SQL Server 2017 or later
Disk space	50GB, but depending on collection size	Fast storage (SSD) recommended, combined with regular storage. Advised 1 TB.

1.1.1 Considerations Regarding Disk Space and speed

Axiell Collections (empty database structure) and software: about 500 MB.

Every average sized record takes up 6 KB approximately. Please keep in mind that the actual disk space depends on the amount of data, the level of detail in the descriptions, and the size of images to be stored. For a museum application with some 20,000 object records and about 5,000 digital images, 5 GB required disk space is a good indication. The digital images take up the biggest part.

Regarding disk speed it is advised specifically for SQL Server Temp DB and Data to use fast storage like SSD. For the media share this can also improve performance.



1.1.2 Axiell Collections and Axiell Internet Server

The Axiell Collections, Axiell Internet Server Application (AIS) and Web API require the Microsoft .Net MVC framework and run on Microsoft IIS Platform. The resources needed for running these applications depends on usage and the number of applications. Please also consult the Microsoft webpage for hardware requirements regarding the usage of IIS.

In cases where the Axiell Internet Server is used for public access, it is installed on a separate server from the API. Access to API will normally be restricted only for the AIS. For Images and media, an Image Handler re-direction / url rewrite is advised.

Depending on performance requirements all Web Applications (AIS, API, Axiell Collections) can be installed on separate VM's.

Part	Minimum system requirements	Recommended minimum requirements
Processor	2 vCPU	4 vCPU
RAM	4 GB	6 GB
Network card	1 Gbit	10 Gbit
Operating System	Microsoft Windows Server 2012r2	Windows Server 2016 or later
Internet Information Services (IIS)	Version 7 or higher	The version that comes with the OS
Microsoft .NET framework	version 4.7 or higher	version 4.7 or higher
Webdeploy (IIS)	3.5	3.6

1.2 Workstation requirements

In the table below, minimum and recommended system requirements for client workstations are listed. Please consult the Microsoft web site for the minimum and recommended system requirements per Operating System. Apple workstations can be used for Axiell Collections or other browser-based applications. For workstations that are only used for browser-based application such as Axiell Collections, see the system requirements of the OS manufacturer. Up to date browser versions are recommended. Supported browsers: Edge, Chrome, Firefox and Safari.

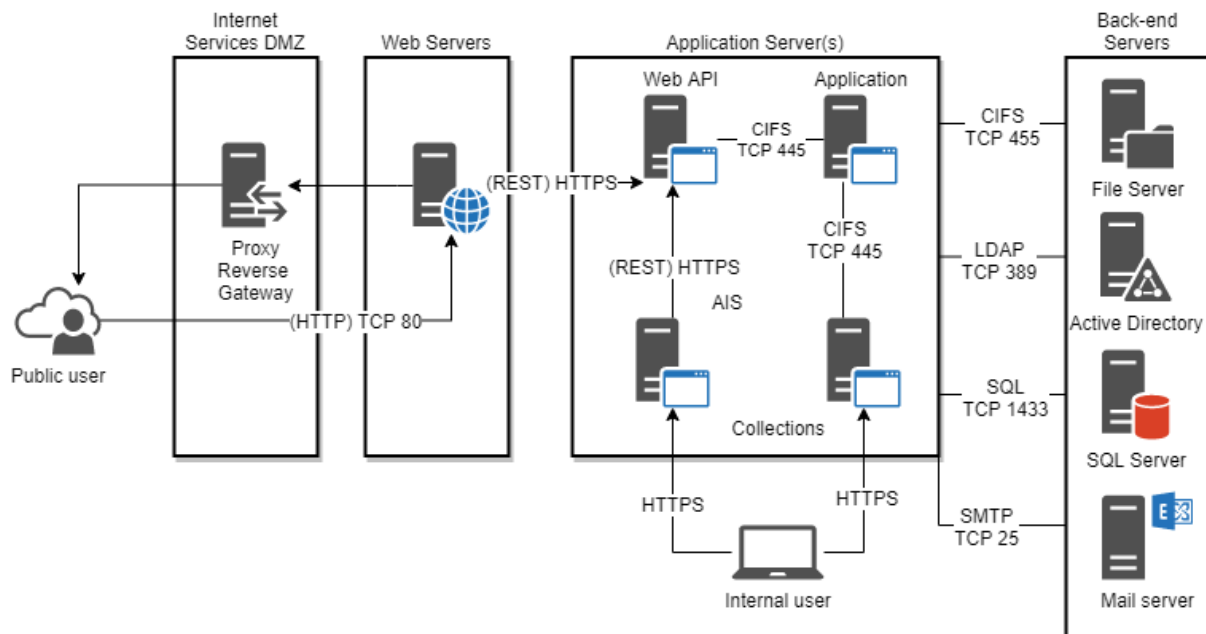
To run the Axiell Designer Windows client you may need an RDP client to the Windows Application Server or run these clients in the local network. A fast VLAN (min 1Gbit) is required in that case.

Minimum requirements as listed below can be used when workstations are connected to an RDP server (Thin Clients).

Part	Minimum system requirements (suitable for RDP use)	Recommended minimum requirements
Processor	Intel, 1 GHz	Intel, 2 GHz
RAM	4 GB	8 GB
Screen resolution	1440 x 900	1920 x 1200 or higher
Network card	1 Gbit	10 Gbit
Operating System	Windows 8	Windows 10 or later
Microsoft Office (optional)	Office 2016	Office 365



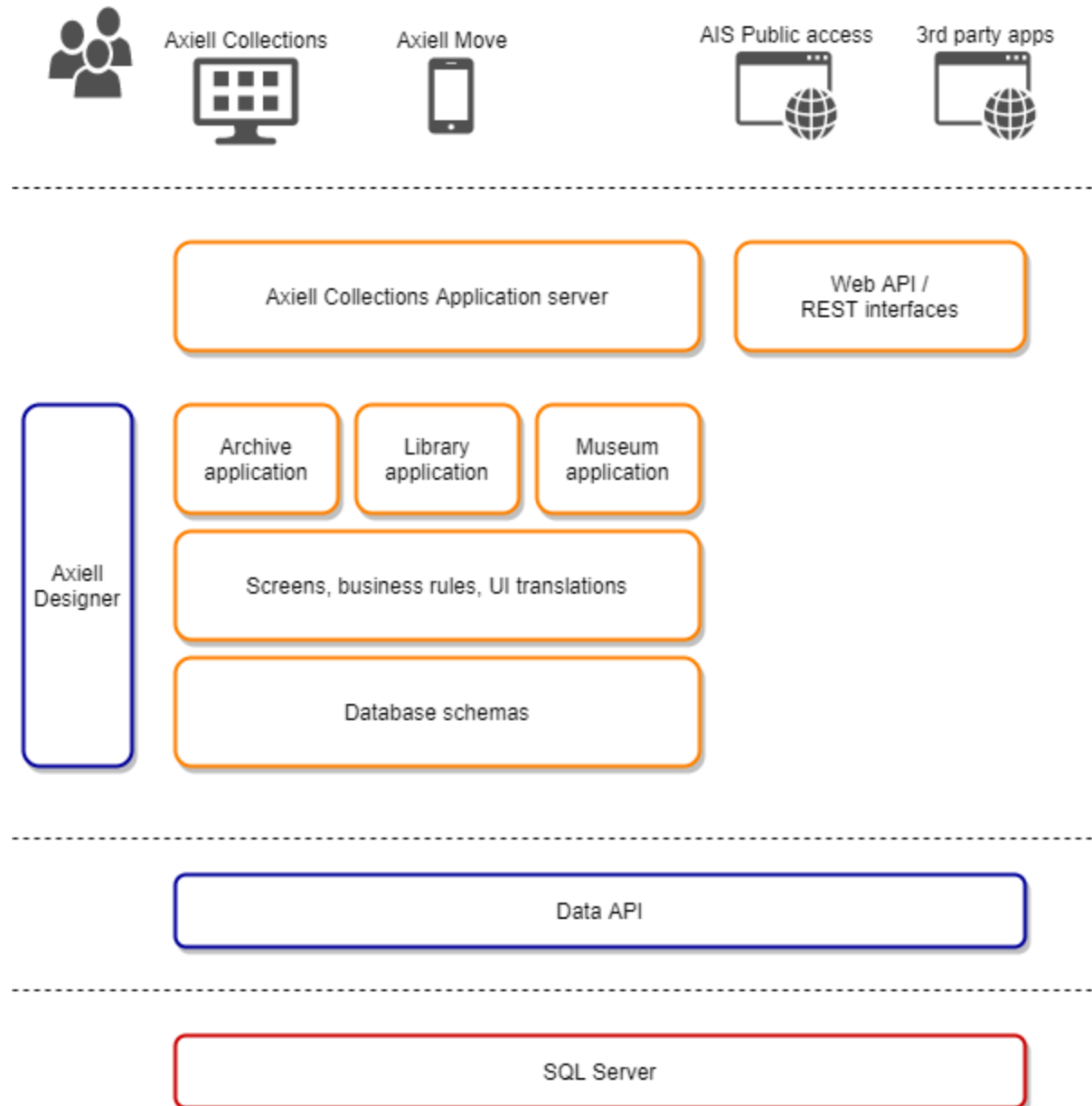
1.3 Infrastructural Overview



The Axiell Collections system may be installed on separate servers for all main components (separation of concerns), or on one (or more) combined servers. The recommended component implementation will depend on expected server load. Typically, the installed servers are virtualized. For more information on server specifications, please consult the Microsoft website.

2 System Overview

This section gives an overview of the technical architecture of the Axiell Collections system and its components. The Windows Operating System components that are employed by the software are also outlined.



3 Axiell Collections Architecture

The Axiell Collections solution consists of 4 distinct layers:

1. User interface code that runs in the web browser.

This code is the presentation and interaction layer and is written in Typescript, which is compiled into JavaScript. The layer communicates asynchronously with the application server over https.

2. User interface code that runs in the application server.

This code implements the logical “controls” that are rendered by the JavaScript layer in the browser and exposes them to the data API. The user interface has view and controller code.

The user interface code is also responsible for state and session management. The user interface code uses the application settings / business logic that are defined in Axiell Designer to create the layout of forms and menus.

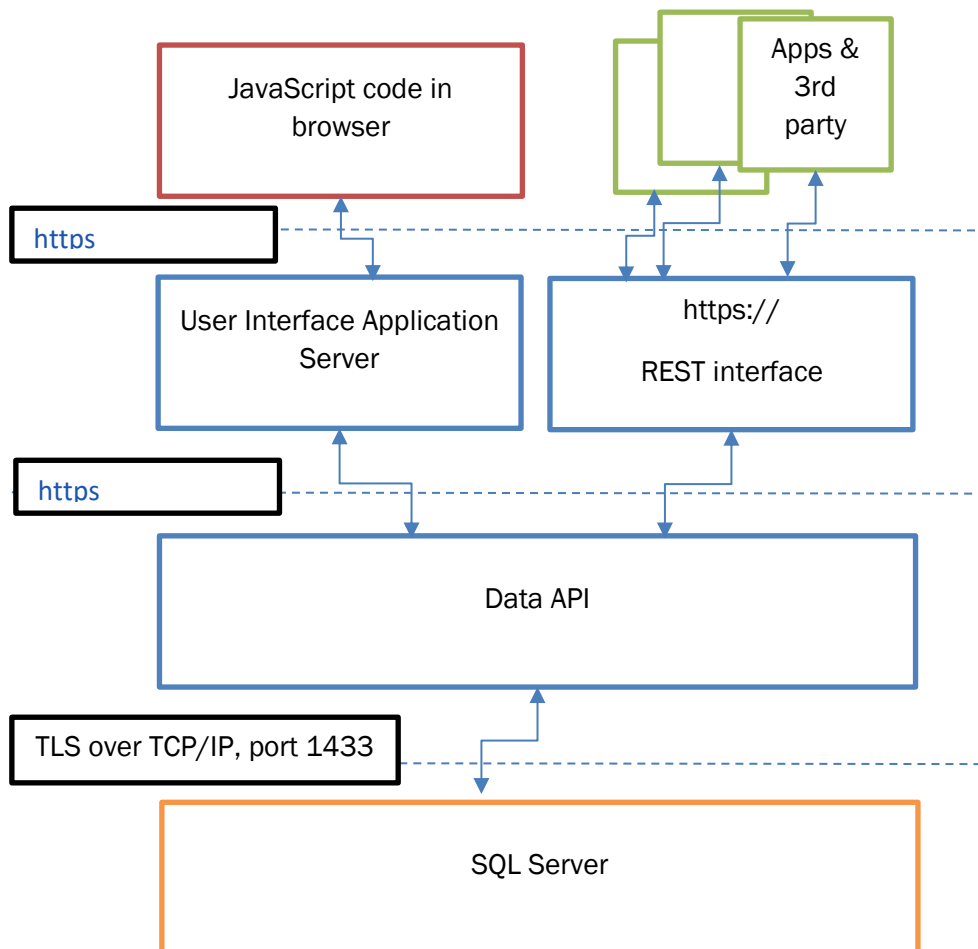
3. Data API

This layer receives Search and CRUD operations from the server User interface code and applies business rules to all data. The Data API serves the data, but it also guarantees that no unauthorized data reaches the application level. Furthermore, the Data API executes the Axiell Collection search language, Adapl scripting and the parametrization that is configured through the Axiell Designer tool. The Data API communicates through SQL with the database layer.

4. Database layer

This is a Microsoft SQL Server database instance with an Axiell Collections specific schema.





In addition, there is a REST Web API interface on top of the Data API. This allows third party products, or specialized applications, such as Axiell Office Connect, or Axiell Move to connect to the data using the same business rules as Axiell Collections itself. It is essential that this access flows through the Data API, since this is the only way that data integrity can be guaranteed if the data is accessed by external applications

The Java-script and App code runs on the user's device, the other 3 layers run on a server environment. These layers can run on a single server, on multiple separated servers, or on multiple application and data servers. The SQL server can be clustered. The exact server configuration is dependent on size and redundancy requirements.

The Java-script code is loaded by the browser from the server. No software installation (other than the browser, Edge, Firefox, Chrome or Safari) is required.

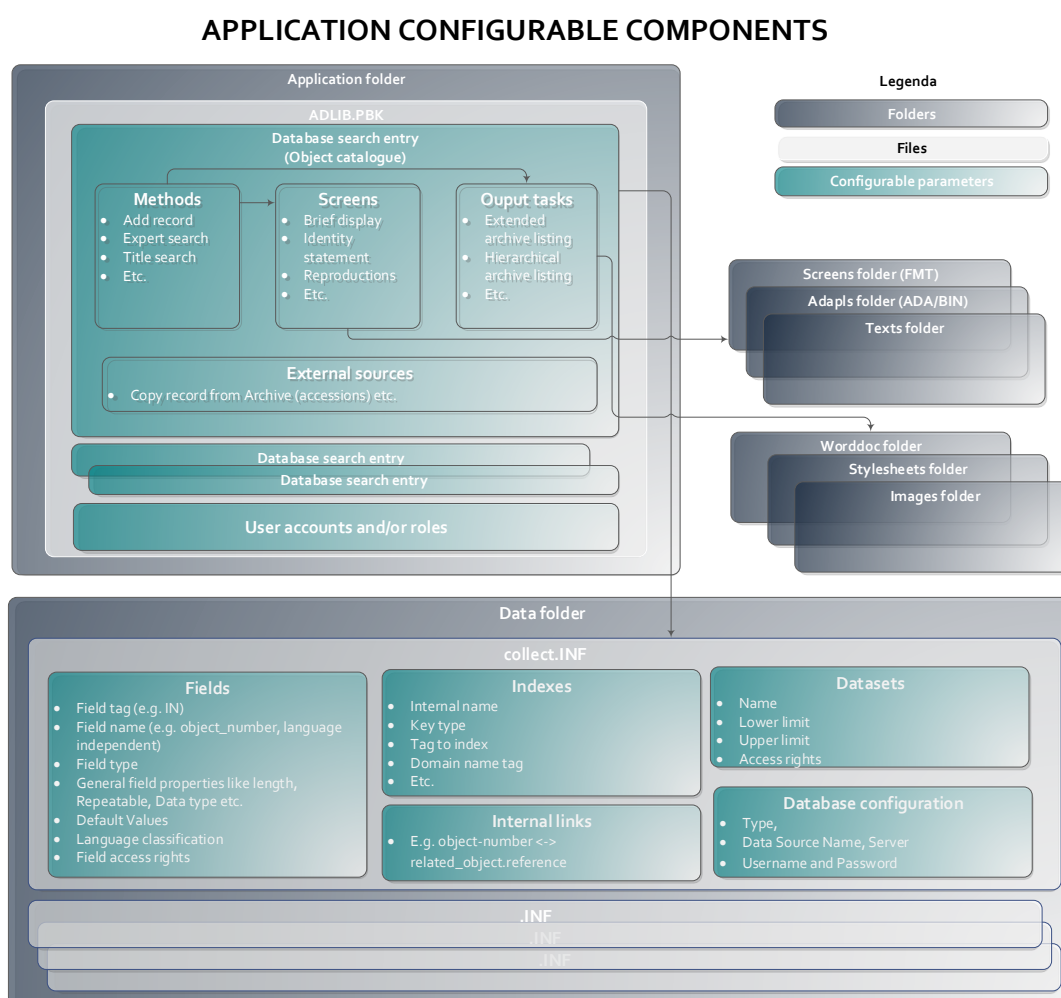
Mobile apps, like Axiell Move, but also third-party apps provide their own user interface and communicate over https with the Web API. Axiell apps are written using Xamarin and run natively on IOS devices.

4 Administration & implementation

Axiell Designer is a comprehensive Windows based tool with a graphical user interface that enables the configuration, administration, and customization of the Axiell Collections system. It encompasses the following main tasks:

- Database maintenance: setup of tables, fields, relationships, indexing strategy
- Security maintenance: creation of roles, groups and access control lists to objects.
- Application maintenance: menu options, screen lay-out, output formats
- Import and export of data
- Adapl script editing and compilation
- Localization (including translations)

The application components are stored in a folder structure that is accessible to the software. Below is an overview of the relevant folders and their content. The components can be configured using Axiell Designer.



For backup and restore, the standard SQL Server tools are used (SQL Server Management Studio).

5 Security

The external clients are web browsers or IOS apps. These communicate over HTTPS to the User Interface Application Server and API server. If required, this can be over a VPN connection. By using https all data exchange on the outside world is encrypted.

The 4 layers can be separated by firewalls, allowing only the specific traffic and port that is required for the communication between the layers. User Interface & Application server and REST interface will be placed in a DMZ, allowing safe access from the Internet.

All interaction with the SQL database is performed in the Data API. The back interface is not exposed to the outside world. Furthermore, the connection to the SQL server can be encrypted. If required, the data in the SQL server can also be encrypted: this would make it impossible for even the SQL administrator to see legible data.

Authentication can be configured using Active Directory, LDAP or through a dedicated User database managed within Axiell Collections. Authorization is based on Groups that will be configured in in the business engine. These groups will be mapped against AD Groups or User DB roles.