





FACTON EPC 12.0 PLATFORM

PLATFORM BASED SOLUTIONS

System Architecture and IT Integration



1. SYSTEM ARCHITECTURE

FACTON EPC Solutions is a highly scalable client-server solutions. The system architecture consists of a classic 3-layer architecture. Users connect directly via their desktop PCs to a server farm of scalable, stateless application servers that consistently save their data in an SQL database.



2. SYSTEM REQUIREMENTS: APPLICATION SERVER

2.1. HARDWARE

FACTON recommends one application server for up to a maximum of 150 concurrent users. For more than 150 concurrent users, FACTON scales with the number of parallel application servers. For example, a system with 4 application servers using the following specification can serve 600 concurrent users.



MAXIMUM NUMBER OF USERS	150 users
CPU*	Minimum 8 physical cores (min. 2.2 GHz clock speed) for up to 25 concurrent users, beyond that 1 additional physical core (min. 2.2 GHz clock speed) for every 5 additional concurrent users (this translates into 33 cores per application server for 150 users)
RAM*	Minimum 64 GB RAM An additional 20 GB RAM per 1,000 calculations with 300 lines**
REQUIRED STORAGE SPACE: INSTALLATION AND DATA	20 GB minimum Additional 2 GB per 1,000 calculations
	* this data applies to FACTON standard solutions

this data applies to FACTON standard solutions and may differ for customer-specific solutions

** this data behaves linearly with respect to the calculations and the number of lines

2.2. OPERATION SYSTEM

OPERATION SYSTEM	Windows Server 2012 R2 and higher versions
.NET FRAMEWORK	4.7.2 and higher versions

2.3. CENTRALIZED USER MANAGEMENT SYSTEM

FACTON users are authenticated via an external identity provider like e.g. ADFS. This identity provider is mandatory and must support one of the following standard protocols:

- OpenID Connect 1.0
- WS-Federation 1.2
- WS-Trust 1.3 with Windows Integrated Authentication (WIA)

2.4. LOAD BALANCER

If FACTON is used in conjunction with an application server farm to support more than 150 users or to create a high-availability scenario, then a load balancer is used.

FACTON works with standard hardware and software load balancing solutions. FACTON recommends configuring »session affinity« on the load balancer.



2.5. DATABASE SERVER

FACTON supports Microsoft SQL Server 2017. It is recommended installing the latest available update of the SQL Server.

	4 cores for up to 25 concurrent users	
	8 cores for more than 25 concurrent users	
RAM*	32 GB RAM minimum plus 4 GB per 10,000 calculations	
REQUIRED HARD DISK STORAGE SPACE	40 GB hard disk storage space per 50,000 calculations with 300 lines **	
DATA TRANSFER	3,000 database requests per second on average for 400 users (IOPS)	

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** this data behaves linearly with respect to the number of calculations and the number of lines

2.6. HIGH AVAILABILITY

2.6.1 APPLICATION SERVER

If there are fewer than 150 users, then high availability can be achieved by means of a second application server equipped with the same hardware as the first application server. Both application servers are then operated behind a load balancer.

2.6.2 DATABASE

To ensure reliability, FACTON recommends SQL Server database clusters with SQL Server AlwaysOn.

3. SYSTEM REQUIREMENTS: CLIENT

3.1. HARDWARE

	MINIMUM	RECOMMENDED
CPU*	Dual Core 2,7 GHz	Quad Core 2,7 GHz
RAM*	4 GB	8 GB / 16 GB for Offline Mode
REQUIRED STORAGE SPACE: INSTALLATION AND DATA	20 GB	20 GB

* this data applies to FACTON standard solutions and may differ for customer-specific solutions



3.2. OPERATION SYSTEM

OPERATION SYSTEM	Windows 10 (x64)
.NET FRAMEWORK	4.7.2 and higher versions

3.3. CLIENT INSTALLATION

FACTON supports the installation of the FACTON Client via the Microsoft Technology ClickOnce or via the setup file.

With ClickOnce, the installation program is published via a link on a webpage in the customer's network. The end user then installs and launches the FACTON Client on the user's computer via this link. The ClickOnce installation is natively only supported by the browsers »Internet Explorer« and »Edge«.

FACTON recommends an IIS 8.5 or higher based web server for publishing the installation webpage.

3.4. OFFLINE

FACTON supports offline operation. All required components including a local database are automatically installed during the client installation. Changes made during work while the user is not connected to the application server are temporarily saved to a local database and can be published to the central FACTON system after reconnecting with the application server.

4. SYSTEM REQUIREMENTS: NETWORK

4.1. DATABASE SERVER – APPLICATION SERVER

A 1 Gbit network connection, preferably with low latency (< 10 ms), is required for the connection between application server and database. The database server and application server should ideally be located behind the same network switch.

4.2. APPLICATION SERVER - CLIENT PC

A 100 Mbit network connection with <20 ms latency is recommended for the connection between the application server and client PC.

However, thanks to the implemented FACTON architecture, it is possible to operate the FACTON client with network connections where clients have a bandwidth of 3 Mbit/s with a maximum latency of 200 ms without using terminal servers.



Communication between the client and application server takes place via https and the corresponding open port (typically 443).

5. CLOUD SUPPORT

FACTON offers support for operating the solution in a private or public cloud. The application server and database server are operated in the cloud in these scenarios. Clients continue to work on the users' local PCs. The network requirements for client-application server communication outlined in Section 9.3 also apply to cloud operation.

The cloud application server and database servers have the same hardware requirements as the physical servers.