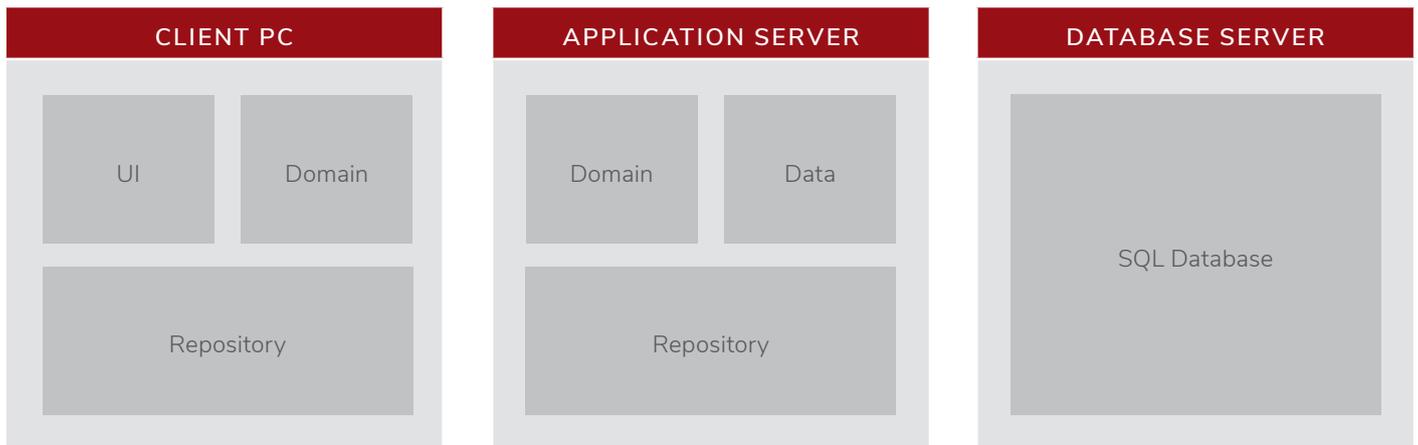


FACTON EPC 9 – PLATFORM BASED SOLUTIONS

System Architecture and IT Integration (valid for 9.1.x)

1. SYSTEM ARCHITECTURE

FACTON EPC Solutions are 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: SERVER

2.1. HARDWARE APPLICATION SERVER

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 behaves linearly with respect to the number of calculations and the number of lines

2.2. OPERATING SYSTEM: APPLICATION SERVER

OPERATING SYSTEM	Windows Server 2012 R2
.NET FRAMEWORK	4.6.2 or 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 EPC 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 2012.

CPU	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)

*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
REQUIRED STORAGE SPACE: INSTALLATION AND DATA	20 GB	20 GB

3.2 OPERATING SYSTEM

OPERATING SYSTEM	Windows 7 SP1 (x64), Windows 8.1 (x64), Windows 10 (x64)
.NET FRAMEWORK	4.6.2 or higher versions

3.3 CLIENT INSTALLATION

The FACTON Client is provided via Microsoft ClickOnce technology. 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 FACTON client is installed in the end user's profile. Only standard user account permissions are required.

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 the 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 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 4.2 also apply to cloud operation.

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

The centralized user management happens via the ADFS by WIA in the customer environment.