System Requirements

CURSOR-CRM, EVI, TINA, CURSOR-APP

VERSION
2021.1

CURSOR®
Software AG

Topic of Contents
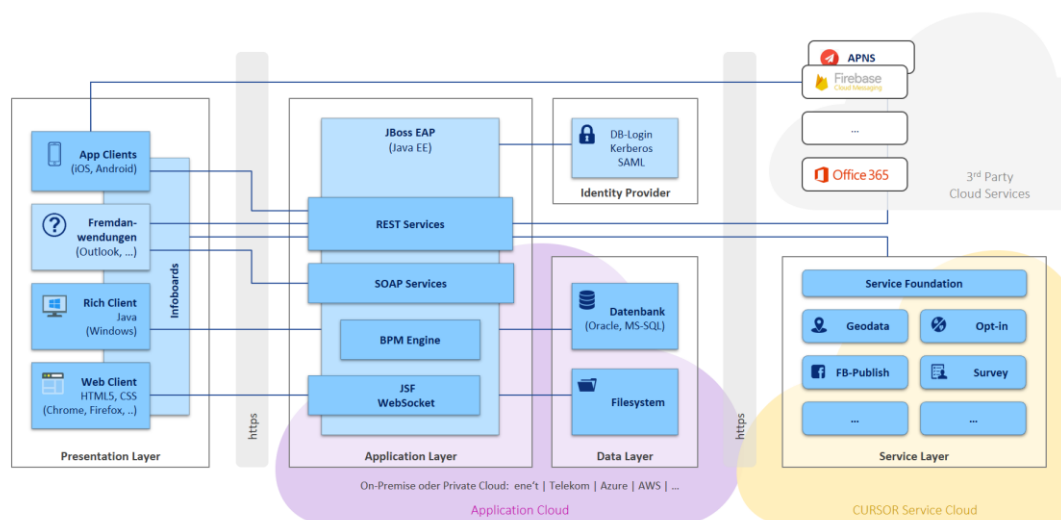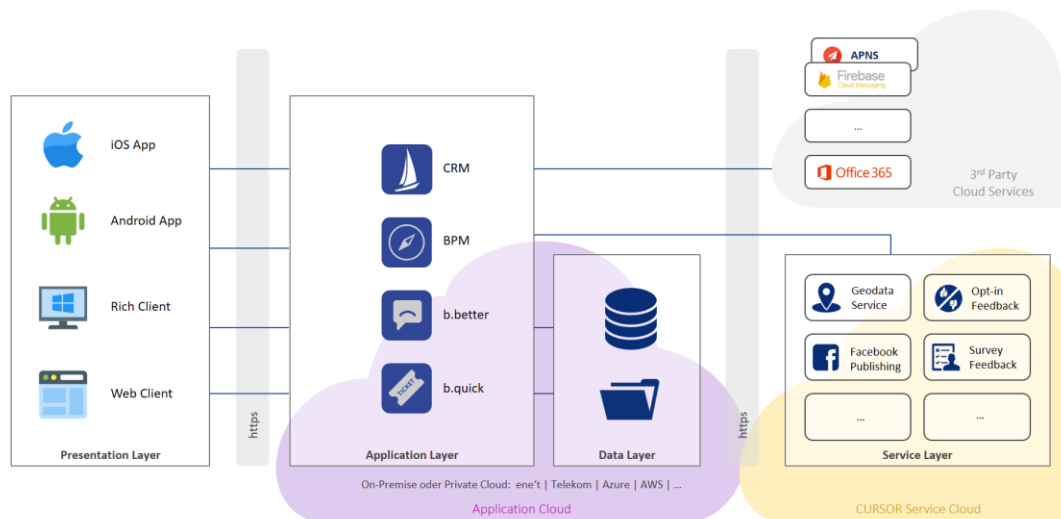
1. CURSOR system architecture

The CURSOR system architecture includes four layers: Presentation, Application, Data and Services.

Four clients are currently available to users in the presentation layer: Windows Client (Rich Client), Web Client, iOS and Android app. Using Infoboard technology, external web applications or individual websites can be embedded in the surface of these clients.
Application and data layers can be operated either in the customer environment (on-premise) or in a private cloud. This can be either the CURSOR Application Cloud operated by CURSOR or a cloud environment of the customer's choice (vCloud, Azure, AWS, ...).
In the CURSOR Service Cloud, which is based on microservices, supplementary services are available that individually extend the application benefits. The application layer can access these services if necessary (on-demand).

Instead of the frontend clients (Rich Client, Web Client, and apps), external systems can also communicate with the CRM application. As a rule, this is done via SOAP-based or – as with apps – via REST-based web services. These can be addressed synchronously or asynchronously directly from professionally modeled BPM processes, which is also the recommended EAI approach for coupling the CURSOR systems with other applications.

2. Database server and application server

According to our measurements, database performance depends mainly on the cache and disk speed. Application server performance is influenced to a large degree by the number of processors and its main storage equipment. A well-equipped machine will mean that the database server can also function as an application server. In that case it must be assured that the highest-performance variant (see below) is used for equipping the processor. In terms of main storage equipment, the sum of all individual values reflects the total storage volume (see further on for examples). In the interest of operational safety, it is better to use separate machines to allow for e.g. reboots of one system without affecting the other.

2.1   Topology with 1 to 10 users

The following configuration is recommended assuming an average of about 5 active users:

Common application and database server

- 4 CPU cores with min. 2.7 GHz

- 8-16 GB RAM

- Solid State Disks (SSD)

- Network connection to all Rich Client workstations: 1 GBit/s

- Network connection to Web Client workstations: Min. 1 MBit/s for 10 users

- >= 20 GB initial hard disk space for all components (DB server, app server, CURSOR-CRM), an additional 50-60 GB required hard disk space for LOGs (for operations over several years without archiving)

- Windows Server 2016 (further supported operating systems in chapter "Application server software")

- Database system Oracle or MS SQL Server (more information in chapter "Database system software")

- JBoss EAP 7.2 (currently: 7.2.4)

2.2   Topology with 11 to 75 users

The following configuration is recommended assuming an average of about 30 active users:

Common application and database server

- 6 CPU cores with min. 2.7 GHz

- 16-24 GB RAM

- Solid State Disks (SSD)

- Network connection to all Rich Client workstations: >= 1 GBit/s

- Network connection to Web Client workstations: Min. 1 MBit/s for 10 users

- >= 30 GB initial hard disk space for all components (DB server, app server, CURSOR-CRM), an additional 50-100 GB required hard disk space for LOGs (for operations over several years without archiving)

- Windows Server 2016 (further supported operating systems in chapter "Application server software")

- Database system Oracle or MS SQL Server (more information in chapter "Database system software")
- JBoss EAP 7.2 (currently: 7.2.4)

Note

For separate application and database server machines, 4 CPU cores should be provided for the application server and 2 CPU cores for the DB server. With regard to other components (e.g. RAM), the data of the next topology level ("topology 76 to 150 users") would be a good orientation.

2.3 Topology with 76 to 150 users

The following configuration is recommended assuming an average of about 50 active users:

Application server

- 4 CPU cores with min. 2.7 GHz
- >= 16 GB RAM
- Hard disk recommendation: Solid State Disks (SSD); otherwise Hardware RAID and hard disks with min. 10,000 rpm
- Network connection to the database server: >= 1 GBit/s (LAN)
- Network connection to all Rich Client workstations: >= 1 GBit/s
- Network connection to Web Client workstations: Min. 10 MBit/s for 100 users
- >= 5 GB initial hard disk space for JBoss incl. JDK, application files and working directory, an additional 50-100 GB required hard disk space for LOGs (for operations over several years without archiving)
- Windows Server 2016 (further supported operating systems in chapter "Application server software")
- JBoss EAP 7.2 (currently: 7.2.4)

Database server:

- 4 CPU cores with min. 2.4 GHz
- >= 16 GB RAM
- Solid State Disks (SSD)
- Network connection to the application server: >= 1 GBit/s (LAN)
- Anticipated database size: >= 30 GB
- Windows Server 2016 (further supported operating systems in chapter "Database system software")
- Database system Oracle or MS SQL Server (more information in chapter "Database system software")

2.4 Topology with 151 to 300 users

The following configuration is recommended assuming an average of about 100 active users:

Application server

- 8 CPU cores with min. 2.7 GHz

- >= 24 GB RAM

- Hard disk recommendation: Solid State Disks (SSD); otherwise Hardware RAID and hard disks with min. 10,000 rpm

- Network connection to the database server: >= 1 GBit/s (LAN)

- Network connection to all Rich Client workstations: >= 1 GBit/s

- Network connection to Web Client workstations: Min. 10 MBit/s for 100 users

- >= 5 GB initial hard disk space for JBoss incl. JDK, application files and working directory, an additional 50-100 GB required hard disk space for LOGs (for operations over several years without archiving)

- Windows Server 2016 (further supported operating systems in chapter "Application server software")

- JBoss EAP 7.2 (currently: 7.2.4)

Database server

- 6 CPU cores with min. 2.6 GHz

- >= 16 GB RAM

- Solid State Disks (SSD)

- Network connection to the application server: >= 1 GBit/s (LAN)

- Anticipated database size: >= 35 GB

- Windows Server 2016 (further supported operating systems in chapter "Database system software")

- Database system Oracle or MS SQL Server (more information in chapter "Database system software")

2.5   Topology with 300 to 500 users

The following configuration is recommended assuming an average of about 160 active users:

Application server

- 12 CPU cores with min. 2.7 GHz

- >= 32 GB RAM

- Hard disk recommendation: Solid State Disks (SSD); otherwise Hardware RAID and hard disks with min. 10,000 rpm

- Network connection to the database server: >= 1 GBit/s (LAN)

- Network connection to all Rich Client workstations: >= 1 GBit/s

- Network connection to Web Client workstations: Min. 10 MBit/s for 100 users

- >= 5 GB initial hard disk space for JBoss incl. JDK, application files and working directory, an additional 100 GB required hard disk space for LOGs (for operations over several years without archiving)

- Windows Server 2016 (further supported operating systems in chapter "Application server software")

- JBoss EAP 7.2 (currently: 7.2.4)

Database server

- 8 CPU cores with min. 2.7 GHz

- \>= 24 GB RAM

- Solid State Disks (SSD)

- Network connection to the application server: >= 1 GBit/s (LAN)

- Anticipated database size: >= 40 GB

- Windows Server 2016 (further supported operating systems in chapter "Database system software")

- Database system Oracle or MS SQL Server (more information in chapter "Database system software")

2.6   Topology with 500 to 800 users

The following configuration is recommended assuming an average of about 250 active users:

Application server

- 16 CPU cores with min. 2.7 GHz

- \>= 32 GB RAM

- Hard disk recommendation: Solid State Disks (SSD); otherwise Hardware RAID and hard disks with min. 10,000 rpm

- Network connection to the database server: >= 10 GBit/s (LAN)

- Network connection to all Rich Client workstations: >= 1 GBit/s

- Network connection to Web Client workstations: Min. 10 MBit/s for 100 users

- \>= 5 GB initial hard disk space for JBoss incl. JDK, application files and working directory, an additional 150 GB required hard disk space for LOGs (for operations over several years without archiving)

- Windows Server 2016 (further supported operating systems in chapter "Application server software")

- JBoss EAP 7.2 (currently: 7.2.4)

Database server

- 10 CPU cores with min. 2.7 GHz

- \>= 32 GB RAM

- Solid State Disks (SSD)

- Network connection to the application server: >= 10 GBit/s (LAN)

- Anticipated database size: >= 60 GB

- Windows Server 2016 (further supported operating systems in chapter "Database system software")

- Database system Oracle or MS SQL Server (more information in chapter "Database system software")

2.7   Important hints

The hardware and software equipment for installations with more than 800 users must be designed individually, whereby cluster operation on the application server side is recommended (further details in chapter "Application server software").

The read cache must be activated (performance) and the write cache must be deactivated (database consistency) for installations with a separate hardware cache for read/write operations. The latter must always be activated for installations, where the caches are not separated.

The above software components for database system and application server have proven effective with our customers, which is why installation and maintenance costs for this exact configuration is budgetable and therefore affordable. Alternatively, other database systems and application servers can be implemented based on platforms other than those listed above (see chapter "Database system software" and "Application server software"). That will, however, mean higher installation and maintenance costs, and specifically for the provision of interface programs for the integration of other applications.

The above hardware requirement applies exclusively for the operation of applications from our Java-based product line. The hardware equipment must be relevantly adjusted if other products will be installed on one of the servers. **That applies specifically for installations in virtual environments, where the resources listed above must have a <u>dedicated</u> assignment to the relevant VM. The CPU component is a main concern here, because the hardware emulation process can reduce CPU performance in a virtual environment by up to 25%. It has proven advantageous to run the VMs for the database system and application server on one and the same host in a virtual environment.**

The latency of a network line between the database server and the JBoss application server should not exceed 1 ms, which is why both servers must be located in the same network segment.

It can happen that the server's CPU may fail to cycle up correctly, which would then negatively impact system performance. Enabling the Windows power option "High Performance" will help with that. This doesn't, however, apply for virtual environments, because there the cycle rate is at 100%. For more information on his topic, please see https://support.microsoft.com/en-us/kb/2207548.

In the following, we will have a look at the example "topology 11 to 75 users" and the main storage requirement of 16-24 GB on the server:

■ Approximately 100 MB will be needed for users on the application server for Rich Clients and around 130 MB per user on the Web Client. Since JBoss will use another 500 MB heap internally, a heap storage requirement of another **approx. 3.5 GB** will be needed for **30 parallel Rich Client users**.

■ Code cache, Metaspace and JVM will need another **approx. 700 MB** internally.

■ In this topology, a main storage allowance of **4-5 GB** must be reserved for the database server process.

■ In a server-based CTI integration, the CTI application server will require min. **2 GB** of storage space (see chapter "CTI interface").

Another application server may have to be added for larger reporting tasks (CSV export, serial letters, serial mails, Excel and mass data evaluations), which will be configured with a heap storage **between 4 and 8 GB** depending on data volumes. For reasons of system load, it is recommended to install this additional application server on a separate machine (or VM).

It makes sense to not only equip the production system appropriately, but also the test system (e.g. "topology 11 to 75 users"), because all user training is usually done on the test systems, as well as approvals for new release versions in terms of quality and performance.

3. File server

Here, a similar load behavior as that of the application and database servers applies, but the number of accesses is not as important as is the size of the transferred documents. The network structure in particular will therefore be affected by the volume of data, where higher user numbers are involved; a system with 500-600 users might therefore benefit from a very high performance file server.

The application server could also act as file server for the topologies described above.

Where a separate server is implemented, it should be equipped as follows:

- 4 CPU cores with min. 2 GHz
- >= 4 GB RAM
- SAS hardware RAID 5/10
  - Note: A Solid State Disk (SSD) is recommended for storing the full-text search index.
- Volume by data quantity: >= 200 GB (for application documents, document backups, thumbnails for document previews and full-text search index, for operation over several years without archiving)
- Network connection to the application server: >= 1 GBit/s (LAN)
- Windows server 2012 R2, 2016 or 2019 (each in Standard Edition)

4. Clients

4.1   Web Client

- The internet browser will require a main storage between 300 and 500 MB depending on version and system customizing.
- Network connection (per client) to the application server: Download >= 1.5 MBit/s, Upload >= 750 KBit/s
- >= 500 MB hard disk space for downloaded documents
- Java Runtime is not required
- Screen resolution for desktop PCs / notebooks min. 1280 x 1024 px, tablet PCs 1024 x 768 px

The following browser versions are currently supported for desktop PCs / notebooks:

- Google Chrome: The use of the most current version is recommended (>= 79).
- Mozilla Firefox version 72 and higher, ESR variant version 68 and higher.
- MS Edge based on Chromium (>= 79).

In addition, the following browsers are supported with restrictions:

- Mac computer: Use on the basis of the current Safari version, whereby the suppression of pop-ups in Safari must be deactivated. Nevertheless, operation is subject to general restrictions (e.g.

no auto-login, no extended document handling, no external calls, no drag and drop of Outlook mails, no linked documents, no keyboard shortcuts)

- iPad: Use on the basis of the current Safari version, whereby the suppression of pop-ups in Safari must be deactivated. Nevertheless, the operation is subject to the same restrictions as with Mac computers as well as additional restrictions (e.g. no document upload, no drag and drop of documents, no double-click function, no individual positioning of mask separators)

- Android tablet PCs: Tablet PCs with Android 5 or higher in connection with Chrome or Firefox, whereby in the case of Chrome, document downloads will only work with an officially signed certificate. In addition, the same restrictions apply here as for iPads. Our internal tests are based on Samsung Galaxy Tab and Google Nexus; usage can therefore not be guaranteed for other device types.

"Scripting" / "JavaScript" must be enabled for all browser variants used. An HTTPS operations certificate must also be set up.

When using browser extensions, e.g. SpellChecker, unexpected behavior may occur in the web client (especially in the HTML editor) which is not influenced by our software. Therefore, the use of such extensions is strongly discouraged.

The CURSOR browser extension and the CURSOR Native Messaging Host must be set up for convenient use of the web client, in particular the extended document handling and external calls. Further information can be found in the installation manual.

4.2   Rich Client

- >= Dual Core with min. 2.5 GHz

- >= 4 GB RAM (CRM application requires around. 500 MB for regular users and up to 800 MB for admins and power users that process large data quantities)

- Network connection (per client) to the application server: >= 100 MBit/s

- The latency of a network line between Rich Client and JBoss application server must not exceed 8 ms, otherwise the Web Client must be used.

- >= 1.5 GB hard disk storage space for the client software incl. caches and Java runtime environments.
  The client software must be stored locally. Client initiation via a network drive will at times result in severe speed losses.

- Java Runtime 11.0.x, free

- Windows 8.1 or Windows 10

- Screen resolution min. 1280 x 1024 px

Notes

Due to the lack of support of vector graphs, the Rich Client does not support scaling of text, apps and other elements. A meaningful use of the Rich Client is therefore not possible on the MS Surface tablet PC, similar devices or 4K monitors.

You should ensure for performance reasons that the computers are not running in power save mode, which means that the recommended default mode "Balanced" must be set.

Notes on the storage requirements of the Rich Client

1. Processing large data quantities

A selection of 40,000 datasets in case of a task list with 15 columns will result in the storage requirement on the client to temporarily increase by 50 MB and to then significantly decrease again, which means an actual increase around 10-15 MB. In order to guarantee the best performance for this selection, the temporarily required 50 MB should be readily available.

More detailed tests with multiple levels and 40,000 datasets each have resulted in a Java heap storage requirement of around 350-380 MB, resulting in an overall storage requirement of 500 MB incl. a "MaxPermSize" (storage for permanent object generation) of 128 MB.

2. Using the Browser View component

In the standard version, the option of integrating a web application in Rich Client masks (or on the desktop) will require 10-20 MB storage space on the Java client. Depending on user behavior and the number of implemented Browser Views, the generated Chrome instances will use several hundred MB of main storage on the client computer, which is around the same storage requirement for loading these views in the internet browser. This is an important consideration, specifically in terms of main storage assignment in terminal server/Citrix environments.

4.3   CURSOR app

- iOS 13 or higher

- Android from v. 7: The Android system WebView must be installed to allow the mapping of the INFOBOARDS in the CURSOR app.

- Here too, the following applies for mobile network connections: Download >= 768 KBit/s, Upload >= 128 KBit/s

- **In the case of system logins it is checked, whether a valid certificate is stored in the JBoss server which has been issued by a trustworthy certification authority. The (self-signed) certificate pre-installed on delivery is not sufficient and must be replaced by a customer-specific, valid certificate.**
  Note: This applies for all systems (development system, qa-/test-system and production system).

5.   Terminal server

Terminal server OS

Windows server 2012, 2016 or 2019, in the Standard Edition with terminal services.

Additional information about the equipment recommendation

- 8 CPU cores with min. 2.5 GHz

- >= 16 GB RAM

- >= 150 MB hard disk space per user profile for caches and edited CRM documents

- Hardware RAID 1

- Network connection to the application server: >= 1 GBit/s (LAN)

Remarks on main storage

The terminal server will generally have to be very well equipped. In addition to the storage requirements of the operating system, around 428 MB will be required for the app per session (300 MB HeapSpace and 128 MB for PermSpace and JVM). Storage requirements increase if other applications are to be run as well (e.g. Outlook, Word, Excel). A second main storage will be required, where CRM masks with Browser Views are added (see above).

Taking into account all of the above factors, a total of around 800 MB main storage will be needed per user, which means that 4 GB of available storage will suffice for 5 simultaneous users without limitations.

Important

Generally the applications can also be run on lower performance systems – with some speed losses.

The client directory must be stored locally on the terminal server computer if a Rich Client is used. Client initiation via a network drive will at times result in severe speed losses.

6.   Remote maintenance

We use remote maintenance options for timely and seamless support services, as well as for system maintenance. Access via remote desktop has proven most effective for us. Remote desktop access is established via a VPN connection.

The desktop provided for remote maintenance must allow access to all applications to be maintained. Furthermore, access to the relevant databases and application servers must be available. This access must include options to start/stop the application server, accessing the database via an SQL editor and the creation or uploading of database backups. On directory level, we will need write permission in program-relevant areas, specifically on the application server and in the log directories.

A workable file transfer option must also be provided for remote maintenance. Where direct data transfer is not an option, the provision of an email account will be sufficient.

A TeamViewer (www.teamviewer.com) implementation should be considered if a local workstation revision is required, e.g. in connection with the client configuration or MS Office. TeamViewer establishes a direct internet connection to the desktop of a remote computer and needs no further configuration.

7.   Database system software

Database manufacturers and news group do not provide information about hardware requirements for varying database sizes and user numbers.

The database systems ORACLE or MS SQL server can be used for data management; database licenses - unless they are offered separately – are not part of the standard delivery scope of CURSOR-CRM.

A pre-installed database software is prerequisite for a CURSOR-CRM installation. The database structure (tables, indices, etc.) will be uploaded in the form of a database dump. DB parameter configuration is done beforehand in agreement with the customer or during the on-site installation.

Some database systems furthermore offer the option of providing the database software in the form of OEM licenses; please confirm such cases with CURSOR consultants.

The following releases should be used for the respective DB systems:

- Oracle: Version 19c or 18c with the latest patches

- MS SQL server: Version 2019, 2017, 2016, 2014 or 2012 (optionally also "R2"); with the correspondingly latest Service Pack
  - For new installations, please use the latest supported version of MS SQL Server database.

While Oracle can be implemented on the Windows platform, as well as Linux (e.g. SuSE Linux, Red Hat Linux) and Unix derivatives (e.g. IBM AIX, Sun Solaris), the MS SQL server is in general only available for the Windows platform.

Final observations

The Standard Edition of the database software is sufficient for a use of the application. If you have a large number of users, very large amounts of data or a general interest in enterprise features, you can consider using the Enterprise Edition. Two factors play an important role here: on the one hand, there is an automated tuning of the SQL run schedules and on the other, the existing hardware is optimally utilized for all routine database operations. That is where the above hardware recommendations come to their full effect.

When using an Oracle database, the character set "WE8MSWIN1252" must be used. Unicode capability is ensured by the use of N data types.

`Latin1_General_CI_AS` should be selected as the sort order for the MS SQL Server. Where a SQL server is used, a setup of the SNAPSHOT transaction level is required to prevent exclusive lock or deadlock. The "SQL server and Windows authentication mode" must be enabled as part of the server authentication configuration.

An implementation of interfaces with other applications is possible only if a procedural supplement exists for the SQL language that comes close to the functional scope of PL/SQL for Oracle or Transact SQL for MS SQL servers.

We urgently recommend foregoing the use of database collectors. A database collector is a server, on which the databases of all kinds of software products are stored centrally. The usage of a DB collector is possible in principle, but can lead to global effects on all involved applications, as long as one (or more) of the databases are used for longer running, performance-heavy actions (e.g. batch interfaces, maintenance jobs for re-indexing, compression or DB statistics).

8. Application server software

Our applications are developed in such a way as to allow the use of basically any application server that complies with the Java EE specification. However, he full functional scope can currently only be guaranteed for the following product:

- JBoss EAP 7.2 (currently: 7.2.4)

JBoss EAP 7.2 is delivered with active SSL encryption. In the release version, a self-signed certificate is used that is classified as insecure by the Internet browser, for example.

=> It is therefore required to use a customer-specific valid certificate!

Background:

Our systems use secure connection routes for cross-technology communication to comply with current IT standards. That requires e.g. the use of certificates to ensure the authenticity, integrity and encryption in all communication. While it used to be sufficient to work with a certificate

provided by CURSOR, this is no longer permitted due to latest security guidelines. Third party systems now require the mandatory use of custom certification for safe communication. Our systems therefore also require the use of its own certificate.

In newer versions the Rich Client login procedure was revised with the result that individual security improvements were implemented and the objective that the Single Sign-On process will be easier to implement in future. The change in login procedure has made the implementation of individual certificates a must due to security reasons.

The following certificate files are required for server and client encryption:

- An SSL certificate for server authentication, which references the server FQDN, on which the application server is installed
    - When creating the certificate, make sure that all DNS invocation names are included in the server certificate (public key), which are used for the CURSOR clients (Web Client, Rich Client, CURSOR app).

- The private key associated with the SSL certificate

- The certificates (public keys) provided by the certification authority and their parent certification authorities (where applicable) [root and intermedia CAs] (i.e.the certification chain must be complete)

Windows Server (2019, 2016 or 2012) or one of the Linux variants SuSE Linux (for Enterprise Server 12.x - 64 bit and higher), Ubuntu Linux (for 18.x LTS - 64 bit and higher) or Red Hat Linux (for 7.x - 64 bit or higher) can be used as the OS platform. Other Linux derivatives should only be used after consultation!

Cluster Operation

To ensure high availability, it is recommended to set up an Active Passive Cluster. The JBoss server can be made highly available via a Windows cluster. If the main application server fails, the second JBoss server, intended as failover, is started and notified to the CRM clients via DNS entry. With such a construct, the JBoss server would have to be mirrored regularly.

If, due to high user numbers (significantly more than 1000 users), a JBoss cluster with load balancing is required, some requirements must be fulfilled, e.g:

- Make sure that the ports for the TCP and UDP protocol are activated between the cluster nodes.

- A separate JBoss server is used as load balancer.

- The CURSOR-CRM application server cluster currently only works on the Windows platform, which means that all cluster nodes must be installed on Windows Server basis.

- Database configuration: Make sure that the database parameter "processes" is scaled up to a matching value when using an Oracle database in cluster operation. In a two-node cluster with max. 300 sessions each in the JBoss session pool, the value for "processes" must be set to around 650.

Final observations

In case of doubt, the use of an Active Passive Cluster construct is preferable to a JBoss cluster. If a tendency towards Active Active Cluster exists, consultation is requested.

The name of the server on which the JBoss application server is installed must be a valid domain name, i.e. the name must contain only letters, numbers and dashes, but no other characters like underscores.

9.　Required port activations

The following ports will be needed for CRM Client operations when a JBoss application server is used:

- 18443 (web port https),
- 19993 (JBoss Management https).

Where port range 2 is preferred over e.g. port range 1, the port numbers will then be 28443 and 29993.

The following additional ports are required for an operation of the JBoss application server in an Active Active Cluster to allow the individual cluster nodes to establish a connection to each other:

- 14712 (Transaction Recovery Manager),
- 14713 (Transaction Status Manager),
- 15520 (JBoss JGroups Service, UDP protocol),
- 17600 (JBoss JGroups Service, TCP protocol).

Where port range 2 is preferred over e.g. port range 1, the port numbers will then be 24712, 24713, 25520 and 27600.

- 45688 (JBoss JGroups Multicast, UDP protocol),
- 45700 (JBoss JGroups Multicast Ping, UDP protocol),
- 23364 (JBoss Web LoadBalancer, UDP protocol).

The following database-side ports must be included for standard implementations:

- Oracle: 1521
- MS SQL server: 1433

The following ports must be activated on the Groupware server for the server-side Groupware connection:

- Mail reception: 143 (IMAP) or 993 (IMAPS with SSL)
- Mail dispatch: 25 (SMTP)
- Exchange calendar connection: 443 (https)

10.　Report engine

Report creation is based on the Open Source tool JasperReports.

JasperReports is a Java library, which can be implemented in any project. The API allows the creation, manipulation and execution of report designs. The report engine is integrated on the application server, which facilitates and speeds up access to reporting data.

Overview of JasperReports advantages:

- Very good performance
- Free (except the manuals)
- Design templates in commonly used XML standard
- Additionally contains complete Java API

- Also supports internationalization

- Optional use of nested sub reports

A runtime installation on clients is not required. The client should, however, have an Acrobat Reader installation to view the reports supplied by the server in PDF format. Where other formats are required, the matching apps should also be installed.

Designers of new reports must have access to the REPORT database scheme, which should be implemented either on the central database server or on another computer that is accessible for report designers (poss. based on the free Express Edition).

A CURSOR-CRM client and the named access (via JDBC) to the REPORT database/instance must also be provided.

11. Groupware connection

A Groupware system can be implemented either via a client-side Outlook connection, which communicates with the Outlook client via the MAPI interface, or by way of a Groupware server (MS Exchange or IBM Lotus Notes).

The client-side Outlook interface option has established itself as standard where Rich Clients are used. To ensure that the Rich Client has access to Outlook, the following group policy settings must not deviate from the default value:

User configuration -> policy -> administrative templates -> Microsoft Outlook 2016 -> security -> security formular settings -> programmatical security

- Configure the prompt for the Outlook object model when accessing an address book
    - default value: Prompt users based on their computer security
- Configure prompt for Outlook object model when reading address information
    - default value: Prompt users based on their computer security

In he case of a Web Client or the inbox manager, a server-side interface technology is used, i.e. the data is not synchronized via the Groupware client, but directly with the server instead.

The mail interface generally requires a mail server that supports the SMTP and IMAP protocols, which is why the corresponding services must be activated on the groupware server (Note: IMAPS with SSL or TLS possible). In the case of MS Exchange, it is also possible to use the mail interface via the Exchange Web Service API (EWS API).

The appointment and task synchronization is implemented via the API of the Groupware system. In the case of MS Exchange, the Exchange Web Service API will therefore be used, which must be available in at least Exchange 2013 for server-side appointment and task synchronization (e.g. on the Web Client). The EWS interface is supported only with the authentication method "Integrated Windows Authentication" (NTLM or Kerberos).

In a Lotus Notes connection, the CRM system accesses the Domino server via the DIIOP protocol. Furthermore, an internet password must be set and database browsing via the internet must also be permitted. Authentication therefore occurs by way of the so-called internet password in the Notes user document of the NAB (name and address book).

Notes regarding the use of CURSOR-CRM Web in the cloud

Prerequisite for mail functionality is that a hosted application server can access the mail server via the SMTP/IMAP interface (at MS Exchange alternatively via EWS interface). For security reasons, the firewall must be configured in such a way as to limit external access of the application server to the mail server only. MS Exchange will be required as a Groupware server if you wish to implement the appointment and task synchronization. The Exchange server is accessed via Exchange Web Service (EWS) interface in conjunction with OAuth2 authentication, that means the option must be enabled, that EWS can be used with OAuth2 authentication.

12. Office Suite

Use MS Office 2013, 2016 or 2019 for your Office area implementation.

The integration with Office 365 has been tested and approved for local installation. However, there is no connection for the web / online versions of MS Word and MS Excel.

13. Telephony integration

Server-based CTI integration

For a telephony integration, you can use a server-based CTI (Computer Telephony Integration), which is available in the Web Client and Rich Client. The telephone system is accessed directly via a communication module provided by our partner Clarity AG.

We recommend installing the CTI server on the same machine as the application server. However, if installation on a separate machine is desired, the following requirements must be observed:

- 2 CPU cores with min. 2,7 GHz

- >= 4 GB RAM

- >= 100 GB hard drive space

- Network connection to the application server: >= 1 GBit/s (LAN)

- >= Windows Server 2012

- Fully implemented RFC-compliant CSTA, JTAPI or MS-TAPI interface to the telephone system. Alternative connections require a technical examination.
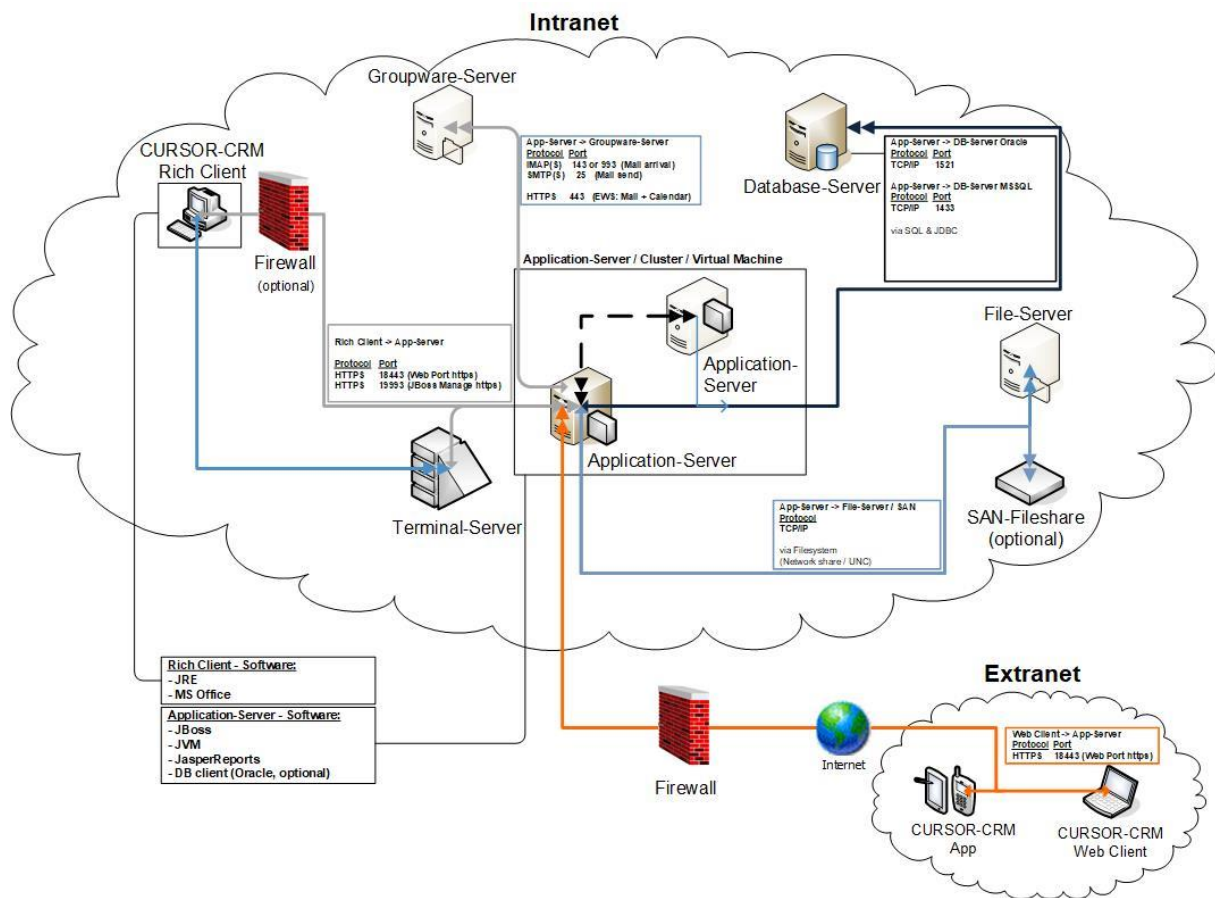
CTI uses the quick start bar in the CRM system to e.g. log and track missed calls.

Client-side TAPI interface

With the conversion of the Rich Client to 64 bit, a client-side TAPI connection is no longer possible, therefore the use of server-based CTI integration is recommended.

14. Example of a CURSOR-CRM system landscape

15. System component approval

The following section discusses the viability of the individual CURSOR-CRM components in their respective systems and in the context of other software solutions.

> **Note**
>
> All products mentioned in the text are trademarked by their respective owners.

15.1 CURSOR - application server

App server	Operating system / VM	Database system	Groupware server
Version 21.1 (JBoss EAP 7.2.4)	■ Windows Server 2012/2016/2019 ■ SuSE from Enterprise server v. 12.x ■ Red Hat from v. 7.x ■ Ubuntu version 18.x LTS or higher ■ CentOS from 7.x ■ VMware from v. 6.5	■ Oracle 18c/19c ■ MS-SQL 2012/2014/2016/2017/2019	■ MS Exchange 2013/2016/2019* ■ Lotus Domino 9.0.x or higher
Version 20.2 (JBoss EAP 7.2.4)	■ Windows Server 2012/2016/2019 ■ SuSE from Enterprise server v. 12.x ■ Red Hat from v. 7.x ■ Ubuntu version 16.x LTS or higher ■ CentOS from 7.x ■ VMware from v. 6.5	■ Oracle 12c(R2)/18c/19c ■ MS-SQL 2012/2014/2016/2017/2019	■ MS Exchange 2013/2016/2019* ■ Lotus Domino 9.0.x or higher
Version 20.1 (JBoss EAP 7.2.4)	■ Windows Server 2012/2016/2019 ■ SuSE from Enterprise server v. 12.x ■ Red Hat from v. 6.x ■ Ubuntu version 16.x LTS or higher ■ VMware from v. 6.0	■ Oracle 11g/12c/18c/19c ■ MS-SQL 2012/2014/2016/2017/2019	■ MS Exchange 2013/2016/2019* ■ Lotus Domino 9.0.x or higher
Version 19.2 (JBoss EAP 7.2.1)	■ Windows Server 2012/2016/2019 ■ SuSE from Enterprise server v. 12.x ■ Red Hat from v. 6.x	■ Oracle 11g/12c/18c/19c ■ MS-SQL 2012/2014/2016/2017/2019	■ MS Exchange 2010/2013/2016/2019* ■ Lotus Domino 9.0.x or higher

App server	Operating system / VM	Database system	Groupware server
	■ Ubuntu version 16.x LTS or higher ■ VMware from v. 6.0		

*only in case of server-side Groupware implementation

15.2   CURSOR - Rich Client

	Operating system	MS Office
Version 21.1	■ Windows 8.1/10	■ Office 2013/2016/2019/365**
Version 20.2	■ Windows 8.1/10	■ Office 2013/2016/2019/365**
Version 20.1	■ Windows 8.1/10	■ Office 2010/2013/2016/2019/365**
Version 19.2	■ Windows 7/8.1/10	■ Office 2010/2013/2016/2019/365**

** Integration with Office 365 is tested and approved in case of local installation. However, no connection exists for the web/online versions of MS Word and MS Excel.

15.3   CURSOR - Web Client

Version	Internet browser	Tablet browser	Network bandwidth
Version 21.1	■ Google Chrome (from v. 79) ■ Mozilla Firefox (v. 72 or higher, ESR v. 68.x or higher) ■ MS Edge on Chromium base (from v. 79) ■ Safari on Mac devices (version 12.x or higher)*******	■ Safari on iOS >=12 ■ Chrome and Firefox on Android 7***	■ Download >=1,5 MBit/s ■ Upload >= 750 KBit/s
Version 20.2	■ Google Chrome (from v. 79) ■ Mozilla Firefox (v. 72 or higher, ESR v. 68.x or higher) ■ MS Edge on Chromium base (from v. 79) ■ Safari on Mac devices (version 12.x or higher)*******	■ Safari on iOS >=12 ■ Chrome and Firefox on Android 7***	■ Download >=1,5 MBit/s ■ Upload >= 750 KBit/s
Version 20.1	■ Google Chrome (from v. 51) ■ Mozilla Firefox (v. 57 or higher, ESR v. 60.x or higher) ■ MS Edge on Chromium base (from v. 79) ■ MS Edge on Windows 10 (version 1803 and above) ■ Safari on Mac devices (version 12.x or higher)*******	■ Safari on iOS >=12 ■ Chrome and Firefox on Android 5***	■ Download >=1,5 MBit/s ■ Upload >= 750 KBit/s
Version 19.2	■ Google Chrome from v. 51 ■ Mozilla Firefox v. 57 or higher (ESR v. 60.x or higher)	■ Safari on iOS >=11 ■ Chrome and Firefox on Android 5***	■ Download >=1,5 MBit/s

Version	Internet browser	Tablet browser	Network bandwidth
	■ MS Edge on Windows 10 (version 1803 and above) ■ MS Edge on Chromium base ■ Safari on Mac devices (version 12.x or higher)*******		■ Upload >= 750 KBit/s

*** Tests are based on Samsung Galaxy Tab and Google Nexus, for other devices no guarantee for unlimited use.

***** Operation on Safari is subject to general restrictions (such as no auto-login, no advanced document handling, no external calls, no drag-and-drop of Outlook mails, no linked documents, no keyboard shortcuts).

15.4   CURSOR - app

App version	CURSOR server version	Operating system	Network bandwidth
2021.1.x	■ 2021.1	■ iOS 13 or higher ■ Android v. 7***** or higher	Minimum 768 KBit/s
2020.2.x	■ 2020.2	■ iOS 12 (iPhone 5s or higher) ■ Android v. 7***** or higher	Minimum 768 KBit/s
2020.1.x	■ 2020.1	■ iOS 12 (iPhone 5s or higher) ■ Android v. 7***** or higher	Minimum 768 KBit/s
2019.2.x	■ 2019.2	■ iOS 11 (iPhone 5s or higher) ■ Android v. 5***** or higher	Minimum 768 KBit/s

****** The Android system WebView must be installed to allow the mapping of the INFOBOARDS in the CURSOR app.

Tips for CURSOR app updates

The CURSOR app must be updated to the matching major release version when the server version is updated.

The server and CURSOR app versions don't necessarily have to have exactly the same patch version installed.

Imprint

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Author: Gebriyel Varli

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Should you have any questions or need further information, please feel free to contact your contact persons from our sales, consulting and support departments. They will be glad to assist you.

Contact Person:
Gebriyel Varli
Software Development Director
Phone +49 641 4 00 00 - 900
gebriyel.varli@cursor.de

Friedrich-List-Strasse 31
35398 Giessen
Phone +49 641 4 00 00 - 0
Fax +49 641 4 0000 - 666
www.cursor.de