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Navision Axapta Object Server

Client/Server technology has become available as a result of the development and successful implementations of distributed computing environments using Personal Computers in Local Area Networks (LANs) and/or Wide Area Networks (WANs) with the concept of separate database engines.

The growth of this trend in computing, which was identified by the notion of a 3-tier computing environment, has been made possible due to reductions in the cost of hardware and software components and the availability of high performance database engines.

In the past three decades, companies were left with few options when it came to implementing, running and maintaining a software solution. With complex infrastructures and limited access to public networks, the only solution was to implement software on a mainframe computer using 'dumb terminals' for the user interface.

In the 1990's a new technology came to life: the client/server architecture that is based on intelligent terminals and central servers. Intelligent terminals were the answer to the growing need for Graphical User Interfaces and integration to software (like office tools, e-mail etc.) coming from different vendors. The

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new client/server technology had one major problem, however: it demanded a lot more bandwidth on the network.

For overcoming this problem, Terminal Server Software became very popular – but this type of product reduced the capabilities and options for the person using this terminal, due to the fact that all software was executed at the server site. This meant that all printing functions, integrations into other products (like cut and paste into MS Office products, etc.) could not be done in connection with the terminal operation of the software. With the advent of the 90's thinking that there should be a computer on every desktop in the organization, this less-than-capable Terminal Server solution was clearly not a step forward.

The first wave of client/server solutions was based on 2 tiers: the database ran on a central server and the software ran on the client (often called fat clients). The 2-tier client/server technology had an advantage, because it enabled companies to run centralized databases. However, there was also a disadvantage of the 2-tier client/server solution: that data had to go over the network – from the database server to the client – which demands a lot of bandwidth on the network. This bandwidth is too expensive on public networks so the 2-tier client/server technology left companies with the same option as before: a mainframe solution with dumb terminals.

The second wave of client/server solutions are based on 3-tiers: the database still runs on a central server, but now the software is being executed on a central server as well, leaving the client (intelligent terminals) to handle the user interface and whatever program logic is needed. The 3-tier client/server solution is today's answer for companies – it demands much less bandwidth on the network, both software and databases run on central servers, and the terminals are intelligent.

Navision has embraced this technology with its newest software, Navision Axapta. Through its advanced 2- and 3-tier client/server technology, flexibility and scalability allow companies to keep pace with changing markets. Navision Strategies:

- We provide ERP solutions that can be accessed via networks with limited bandwidth.
- We provide a choice of centralizing or decentralizing the ERP solution depending upon network infrastructure.

The Navision Axapta Enterprise Edition offers companies a unique 3-tier client/server technology with the Axapta Object Server.

Object Server Technology

Axapta Object Server is based on well-established industry standards. This keeps technical requirements to a minimum. The network communication is based on TCP/IP and, as with Axapta in general, the

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database support is provided by an SQL database. All system-related tasks are based on the facilities provided by the operating system (logging, performance monitoring, etc.).

For communication between clients and server, the specially developed Axapta Object Communication Protocol (AOCP) serves as a robust and easily administered protocol. AOCP is based on TCP/IP, which makes it run in virtually any environment - LAN and/or WAN. Using TCP/IP even makes it possible to implement WAN environments based on the Internet for communication to the provider. The strict implementation of AOCP also eases the use of Virtual Private Network (VPN), recommended for private traffic implementation on public networks like the Internet. The database engine for the Axapta Object Server is a further evolution of the engine used in the Axapta 2–tier clients.

The database engine features have been extended with capabilities to share resources among all the connected clients. These new features include sharing record caching, SQL connections, and cursors to optimize performance.

The fairly unique concept of Axapta Intelligent Client (AIC) makes it possible to build a setup where clients with different hardware potential (clock speed, network, memory, etc.) each benefit most from the AOS architecture. AIC enables heavy client machinery with high bandwidth to exploit their possibilities by accessing SQL Database directly while still allowing other clients to run as "thin" clients with the AOS executing business logic for them. The AIC comes in a number of variants: the traditional rich Windows GUI Client, the Axapta COM/DCOM Connector, and the multi-session capable Axapta Internet Connector able to interact with Microsoft Commerce Server and Microsoft Transaction Server.

The AOS itself is built as a Windows NT Service with a number of additional processes running the AOS Instances. Each process is responsible for running one Axapta application. One Windows NT Server can run more than AOS and thereby service clients with multiple applications. Multiple Windows NT Servers can cooperate on servicing a single application. Different possibilities are present for this, each having its own characteristics concerning maintenance, performance, scalability, and reliability. These setups are based on the two basic modes of the AOS: Exclusive mode and Shared mode.

How is AOS different from Microsoft Terminal Server

The Windows Terminal Server (WTS) and the Citrix MetaFrame architecture are terminal systems, like the name of the Microsoft variant indicates. This can be compared to the architecture of UNIX-based terminal systems where ANSI or VT-terminals front a 100%

host-based application. The WTS technology brings these capabilities into the Windows environment making it possible to run Windows programs on a central server through terminal emulation. This offers a number of advantages like remote access, Net PCs and centralized server centric application management and deployment. The AOS environment, on the other hand, is based on an Intelligent, full-featured Windows32-type client (Axapta GUI client, Axapta COM Connector, etc.). These clients offer full integration at the desktop level, direct access to local client resources, and easy, effective integration with several client relative add-ons such as readers, scanners, printers, mechanical devices, etc.

However, the most important difference between an AOS and a WTS environment is the scalability on the server side. A server configured for running a number of Axapta clients using WTS is typically capable of scaling to a much higher number of Axapta users running AOS in the exact same environment. Even in situations where WTS is the only possible choice (e.g. when using Net PCs), the AOS is able to boost the scalability of the WTS system by factors.

Another important difference between AOS and WTS technology is the network load pattern. The WTS technology results in sustained traffic between the client and the server at any time when interacting with the program. Each mouse movement or any key press results in network traffic. The AOS, however, does not generate network traffic unless the server is actually involved in the current operation, e.g. browsing through customer lists results in only a few network transmissions when getting the data to present itself. This data is collected in larger chunks, too, to reduce the number of network communications. When the client has obtained the required information from the server, no further network traffic is generated. This frees up the available bandwidth for other clients to use, thereby improving the number of concurrent users on a given amount of bandwidth.

Single Node Object Server (Exclusive Mode /Advanced Object Server)

The Exclusive Mode of the AOS applies to systems where one AOS services an application exclusively to all clients. In such an environment, only one AOS operates for each application running. This gives wider possibilities for exploiting caching mechanisms to obtain better basic throughput. It also provides efficient means for obtaining One-system Awareness (the situation where all clients are known and controlled by one central instance capable of dispatching messages, reporting on complete system condition, and managing all sessions).

Load Sharing Object Server (Shared mode /parallel Object Server)

The Shared mode of AOS is used in situations where AOS, for any reason, must coexist with other AOS (or during migration to the AOS environment, to coexist

with standard 2-tier Axapta clients accessing the same application and data resources). In the Shared mode, the AOS allows others to access the application object database (AOD). This allows starting multiple AOSes (at different Windows NT Servers) servicing the same network-shared application, and accessing the same data at the SQL server. This mode gives a reduced basic throughput (compared to the Exclusive mode AOS) due to the reduced possibilities with respect to caching, but it provides a wider specter of scalability by allowing a number of Object Servers to run in parallel. Using the *Load Balanced Client Connect* feature of Axapta, the client sessions are distributed over the servers available when a client logs in. In such an installation, even servers of different capacity can cooperate on servicing clients in the load-distributed AOS environment.

AOS and Windows NT Cluster Server

Both the Exclusive and Shared Mode of Axapta Object Server can be combined with Windows NT Cluster Server to provide extended security against system outage.

Providing connectivity in the AOS environment

Due to the fact that network communication in the AOS environment is based exclusively on TCP/IP, a very broad mass of connectivity is available. Connections based on ISDN, frame relay, leased lines, cellular data communication, or modems are all possible solutions for providing connectivity for situations ranging from a single remote user, to a few users at a small subsidiary, to a large number of users at remote production plants. Due to the different characteristics of the individual communication methods, it is very important to select the proper communication means for the given installation. Figures like guaranteed bandwidth, propagation times, and quality of service all have to be taken into account when planning the connectivity.

Satellite connections in particular tend to cause confusion due to high bandwidth but long propagation times, which more strongly than other technologies favors sustained transmissions over interleaved transmissions. Axapta, like any interactive application, will produce interleaved transmissions. Therefore, it is vital to verify correct behaviors in every given customer situation where special connectivity (like satellites) are being used.

The fault tolerance of the connections used should also be taken into account. If communication lines tend to generate communication errors, more robust communication means should be used to connect systems (i.e. compensating for poor communication lines with use of more sophisticated connectivity devices with built-in fault tolerance, error correction, etc.).

When to use what ?

By offering this broad variety of connectivity and client/server models, Navision Axapta is the obvious choice for every installation from a local 2-tier system to multi-site systems, e-commerce, and for setups involving integration to other vendors' software. Following is a brief description of what to choose in which situation.

Small to medium-sized company, single site

This is a traditional Axapta 2-tier setup. Clients are connected to a high-speed LAN and all are running their own full-featured Navision Axapta, connecting directly to both the Application Database (on a file server), and the SQL database (on a Microsoft SQL Server or an Oracle RDBMS). It is possible to use the COM Connector and the multi-session Internet Connector in this environment. Very limited remote access capabilities are available for this kind of setup.

Medium-sized company, multi-site

In the multi-site environment the AOS is the best choice. An Exclusive mode, centrally placed AOS allows remote sites to connect as thin clients, sharing bandwidth (approximately 10 clients per 64kbit). Local clients can run as either thin or fat clients to exploit as much client capacity as possible, and to eventually off-load the AOS. All Navision Axapta Connectors and clients can be used in this setup. Utilizing the AOS technology, this kind of setup offers remote capabilities like connecting clients using VPN/Internet connections.

Medium to large-sized company, multi-site

Just as for the medium-sized company, this setup should be based on the Exclusive mode of the AOS combined with the Dual Object Server capability. This enhances both basic performance and reliability. As in the other configurations, all Axapta connectors and clients can be used in this setup. Remote access capabilities are ensured by the AOS technology.

Large to very large-sized company, multi-site

Using parallel Axapta Object Servers makes it possible to cope with very large installations. This configuration allows setting up virtually as many parallel Axapta Object Servers as desired. This requires massive SQL Server capacity but supplies vast amounts of scalability and automatic reconnect/recovery. All sorts of Axapta clients and connectors are possible in this setup, giving the ability to handle almost any situation whether remote connectivity, web integration, or e-business.

Information on sizing, performance and scalability

It's a fact that sizing, performance and scalability are of highest interest when it really covers the customer's situation, load pattern, needs, and environment. Due to this, Navision offers a wide range of assistance, calculations, and measurements to the business partner, and to Navision Axapta customers.

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Summary

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Benefits of Navision Axapta Object Server

- AOS offers 3-tier thin client technology with a low bandwidth demand, which minimizes the cost of data communication, enabling the use of leased or dial-up lines.
- Due to the advanced component technology, additional products like the Windows Terminal Server are not necessary in order to use the Axapta Intelligent Clients.
- AOS runs in a standard Windows NT Server/Windows 2000 Server environment, which can handle hundreds of Axapta Intelligent Clients. By using Standard Windows NT Server/Windows 2000 Server technology, minimum cost of maintenance and administration is ensured.
- TCP/IP is the communication protocol between the Axapta Object Server and the Axapta Client, which is a widely used standard ensuring a minimum amount of administration.
- Centralized maintenance and administration means the lowest possible cost of ownership on an ERP system.
- Using the Axapta Intelligent Client will, when compared to ordinary thin clients like Windows Terminal Server, will greatly ease the integration with local software and components on the PC Client, thus making the “computer on every desktop” theme a true reality.

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