Building AS/400 & Windows NT client/server applications with LANSA

A guide to successful client/server applications
for AS/400 Windows NT co-existence

LANSA
A declarative software made simple

Building AS/400 & Windows NT client/server applications with LANSA

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Please note: While every attempt has been made to ensure the accuracy of the information contained in this white paper, readers are advised to draw their own conclusions from multiple references.

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Building AS/400 & Windows NT client/server applications with LANSA

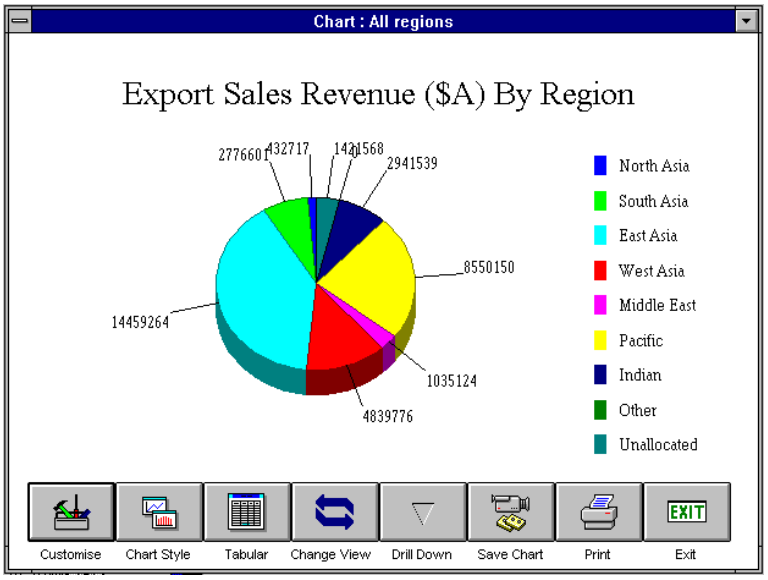
A guide to successful client/server

Client/server has become an essential style of application for the 1990s. This guide examines the key success factors in implementing client/server applications and shows how LANSA can rapidly build not only Windows-based client/server applications but applications that co-exist across multiple platforms including AS/400 and Windows NT.

It covers the following topics:

- **Why client/server for your AS/400? Why Windows NT?**
  There are sound business, cultural and management reasons for building client/server applications to more effectively support the business goals of your organization. The Windows user interface is essential. But organizations also need the flexibility to easily move parts of applications between the AS/400 and Windows NT to take advantage of Windows ease-of-use as well as AS/400 robustness. Only LANSA gives you this flexibility.

- **Rapid solution delivery**
  A rapid implementation yields earlier business results and LANSA has been designed to produce robust client/server applications as rapidly as possible. Developers are shielded from the complexity of client/server as user interfaces are built rapidly while also being shielded from the complexities of network communications and database access syntax. For Visual Basic users ACE generates VB while seamlessly accessing AS/400 data. PowerBuilder users are delighted by PASIVA's tight integration with DataWindows, making AS/400 access easy.



Modern business users require the productivity of a Windows user interface

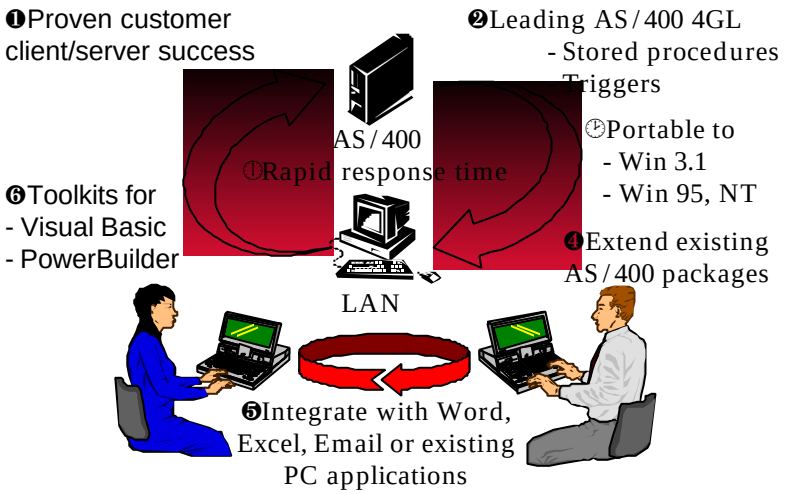
- **Rapid response time**
  A key AS/400 challenge is to provide acceptable client/server response times. LANSA's intelligent middleware is the fastest on the market. Unlike ODBC which is often suitable only for query tools, it uses native AS/400 facilities to optimize response times for commercial transaction processing (OLTP). See a demonstration. Invest in a pilot. Like so many of our customers, you will discover that LANSA client/server solutions will give you a competitive edge.

- **Rapid response to change**
  Underlying application and technical requirements evolve continually. LANSA has a proven history of rapidly responding to both types of change. Our lengthy list of successful client/server customers is proof.

- **Key steps to success**
  This section shows you how to get started with a customer-proven series of steps to ensure your success.

- **The LANSA family of products**
  The LANSA family includes products that can rapidly create a Windows graphical user interface, intelligent middleware, and a development environment for creating portable stored procedures and triggers for multiple platforms including both the AS/400 and Windows platforms (Windows 3.1, 95 and NT).

- **LANSA client/server services**
  Professional services can be the key to a successful implementation. A comprehensive packaging of LANSA services is available.



LANSA provides a complete client/server solution for AS/400 users

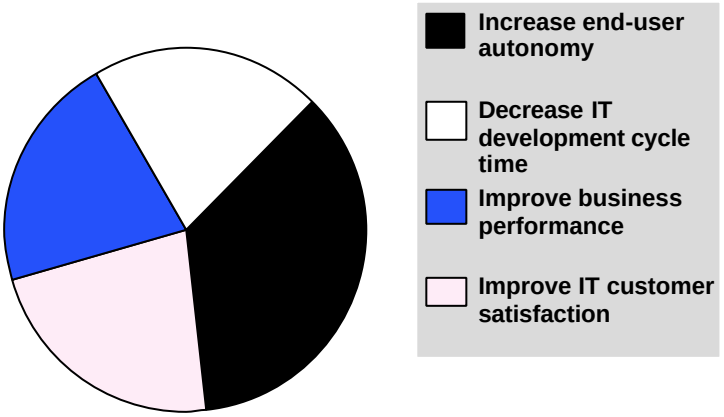
Why client/server for your AS/400?

The AS/400 has a well-deserved reputation as a robust platform for commercial applications. Traditionally, these applications have used a "green screen" 5250 terminal user interface. While these applications are, in many cases, still providing sound business benefits, client/server applications have also become essential for businesses to compete in the 1990s:

- **Cultural challenges**
  User expectations have risen to expect a Windows-style interface as the mark of a modern application as PCs and Microsoft Windows have become part of the standard office equipment for modern workers. Executives approving IT purchases have also adopted Windows and expect IT managers to implement client/server applications.

- **Business challenges**
  We are all in an era of rapid and continual change as global competition forces all businesses to make more rapid decisions and to provide higher levels of customer service. Computerization is now automating the activities of mobile workers and linking customers and suppliers together across networks. Applications must continually change to address changing requirements.

- **Management challenges**
  Management structures have changed to respond to the business challenges. Workers are empowered to make decisions more rapidly with far less direct involvement by executives. Business users require tools that offer greater flexibility and support increased autonomy.



Source: Computerworld survey, Oct 1995

Client/server provides the flexibility and autonomy demanded by modern business users

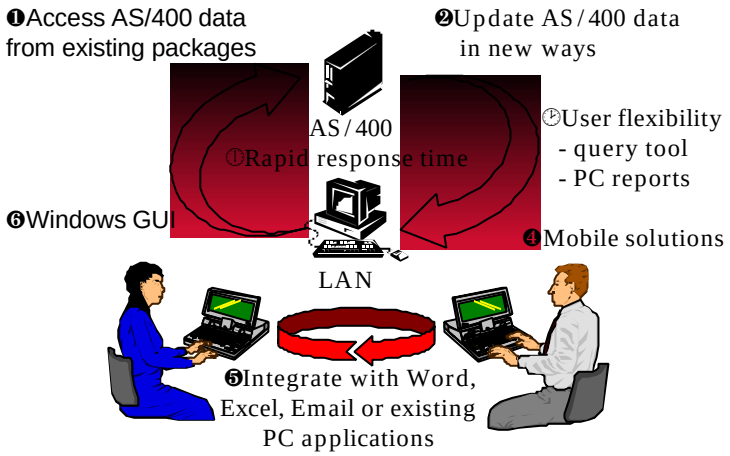
- **Technical challenges**
  PCs cost less to buy than AS/400s. PCs also provide the desktop power and flexibility demanded by modern business users. However, PCs are costly to manage. Only LANSA allows you to flexibly move parts of applications across Windows platforms and the AS/400 to take best advantage of the strengths of both. Your investment is protected. Your flexibility is enhanced.

IDC surveyed Application Development Managers in 1995 and listed the top 3 benefits of client/server applications:

1. Increase end-user productivity
2. Improve end-user access to data
3. Increase customer service

ComputerWorld asked sites why they were implementing client/server applications and were told:

- Increase end-user autonomy
- Decrease IT development cycle time
- Improve business performance
- Improve IT customer satisfaction



End user productivity requires multiple client/server features.

Why Windows NT with the AS/400?

The AS/400 was originally designed for non-intelligent terminal (or 5250 data stream) devices. With a growing population of PCs and LANs in their AS/400 environment, companies need a way of integrating the AS/400 environment with the PC environment. A Windows NT gateway is a logical choice:

- **Office - BackOffice**
  Many companies have standardized on Microsoft Office. Windows NT BackOffice is designed to integrate with Office.
  For example, a telemarketing application can centrally store Office templates on the Windows NT Server, standardizing letter formats for all staff. The AS/400 probably contains the customer database. A client/server application could allow a Windows 3.1 user to select customers from the AS/400, mailmerge using the Windows NT resident Word templates and then fax the result.

- **Ease-of-use**
  Microsoft NT provides ease-of-use LAN management, a natural partner for the easy-to-use AS/400 commercial application system. SNA Server is remarkably straightforward to configure for each client desktop, often taking as little as 3 minutes.

- **SNA Server can defer or completely eliminate an AS/400 upgrade**
  Microsoft SNA Server allows Windows 3.1 (and Windows 95 and Windows NT) applications rapid access to the AS/400. Independently verified performance tests (by the Tolly Group) show that SNA Server can reduce AS/400 CPU utilization by up to 18% and improve response times by up to 33% because it offloads communication processing from the AS/400. Moreover, SNA Server means your AS/400 does not need to be upgraded to one with an FSIOP.

- **Windows NT is versatile and grows with you**
  Windows NT can not only provide file and print serving capabilities but also fax, email, database and application and systems management services. A company can begin small with file and print serving and extend over time to more sophisticated services.

- **Windows NT is a robust 32-bit operating system**
  Even Windows 3.1 is more stable when used with SNA Server because it saves precious DOS memory by not requiring any MS-DOS components. (PC Support and CA/400 require MS-DOS memory).

- **SQL Server is a commercial database server**
  SQL Server is a high performance database, allowing the same Windows NT platform to be used, for example, as a client/server extension with real-time update, batching data to a traditional batch update AS/400 application.

Should the AS/400 be discarded?

Absolutely not. The AS/400 continues to have an important role in modern business. IBM is evolving the AS/400 to have better Windows integration and Microsoft is evolving its products to have better scalability for larger enterprises. A portable LANSA solution permits customers to take advantage of the IBM or Microsoft solution best suited to a given application's requirements for scalability or Windows ease-of-use.

- **Wide range of application types besides Windows**
  Modern applications contain diverse user interfaces besides Windows-style. A glance at the computer systems used by many small retail businesses reveals DOS-based character user interfaces with bar code readers. The 5250 display terminal is still the fastest way to perform high-volume manual data entry. New business processes are replacing many 5250 data entry applications with EDI (Electronic Data Interchange). Similarly, Electronic Funds Transfer at Point of Sale does not require a Windows user interface.
- **Scalability of vendor solution - the IBM advantage**
  IBM has an impressive history of delivering high volume enterprise solutions. The AS/400, as an integrated database machine, is ideal as an enterprise database server. For example, data is optimally stored across many disks for both high availability and high performance. All managed automatically by the integrated machine. IBM moved 5250 applications to 64-bit processing with a smooth planned architectural extension.
  Microsoft's experience is primarily with PCs and smaller enterprises. While SQL Server has plans to support very large databases, the AS/400 has already demonstrated this capability. Windows NT remains 32-bit.
- **Ease of rapid graphical development - the Microsoft advantage**
  On the other hand it is Microsoft that can demonstrate superior Windows graphical client/server development today and IBM that plans to integrate the AS/400 more tightly with Windows.
  For example, database domain integrity refers to the valid entries for a given column and is enforced by restricting the range of possible values. IBM has primitive validity checking that is applied only for 5250 applications. Client/server applications have no domain integrity.
  In contrast, Microsoft SQL Server contains sophisticated domain integrity that is very easy to program. Similarly, SQL Server contains a 4GL for creating triggers and stored procedures. IBM's DB2/400 does not.
- **Portability of business rules - the LANSA advantage**
  LANSA's 4GL can create domain integrity, stored procedures and triggers, all with native performance and portable across both DB2/400 and SQL Server (and Oracle and ODBC-compliant databases).
  Three-tiered client/server applications can use the same business rules for SQL Server on Windows NT and on DB2/400. For example, an NT Internet gateway could process Internet orders using the same rules while DB2/400 is protected from Internet access.

Rapid solution delivery with LANSA

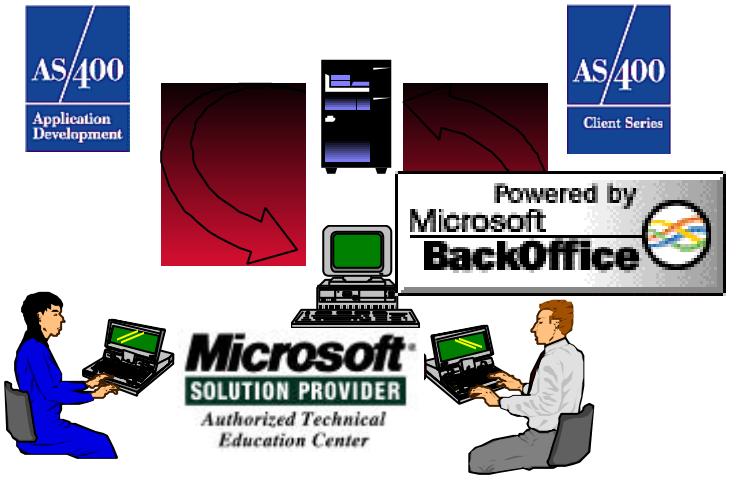
The increasing competitive pressures demand a rapid solution delivery. The Windows user interface must be created as rapidly as possible but client/server also includes server-side application development:

- **Rapid creation of Windows GUI**
  Visual Basic is the tool of choice for many sites because of the easy learning curve and resulting rapid creation of the user interface. Other sites may already have skills in PowerBuilder, SQLWindows, Delphi or other client-side tools such as Access and Visual FoxPro. Flexible applications may require Microsoft Word or Excel to be integrated with AS/400 data access.

  LANSA can work with any Windows tool that can call a DLL. Rapid productivity toolkits exist for Visual Basic and PowerBuilder that minimize the amount of GUI code that needs to be written. LANSA also offers its own GUI creation tool that has the added benefit of portability across multiple client platforms.

- **Rapid creation of Server-side application**
  It is now well accepted that client/server applications should be written with as much function as possible on the Server and the load on the communications network reduced as much as possible.

  - **Re-use existing Server-side applications**
    Gartner Group believes that as much as 40% of client/server applications can be developed by reusing parts of existing applications. Traditionally, AS/400 applications have been menu-driven with the developer deciding in advance the



Aspect Computing, the developer of LANSA has strong business partnerships with both IBM and Microsoft

sequence of inputs and outputs. This modal style of

application is being replaced by the event-driven flexibility of client/server applications. However, the underlying database is usually still highly reusable.

LANSA can readily reuse your existing database, even if non-normalized files are used. This speeds your development, realizing benefits sooner.

- **Create stored procedures and triggers in LANSA's 4GL**
  In 1995, LANSA was voted by readers of *Midrange Systems* as Number One 4GL on the AS/400. It is the natural, highly productive choice for building server-side AS/400 logic and is recommended by IBM in its Client Series.

  Business rule data validations, domain and referential integrity, error messages and even help text can be defined in LANSA's Object Repository without any programming. Once centrally defined, definitions can be inherited or reused across multiple applications.

  Stored procedures and triggers are created with LANSA's 4GL which is very easy to learn and highly productive, offering a cross between the simplicity of the AS/400 Command Language and Visual Basic.

- **Extensive customer reference sites**
  There are now thousands of successful LANSA client/server customers across many countries and many industries. This is not only proof of the success that you can enjoy with LANSA, but also provides an ever increasing base of experience.

Andersen Consulting, American Airlines, ANZ, Banca Commerciale Italiana, Bank Von Ernst, Baskin Robbins, Britvic Soft Drinks, Chase Manhattan Bank, China Ministry of Finance, Daihatsu, Daiwa, Disney, Duracell, EMI, Fuji, Hasbro, Hilton, Hong Kong Productivity Council, Hyundai, IBM Japan, ICI, Ingersoll Rand, Japan Airlines, Johnson & Johnson, JP Morgan, Jenny Craig, Kawasaki, Kenwood, KLM, Lancaster, Long Homes, Lucas Aerospace, Lyons Tetley, Meadow Lea, Mitsubishi, MTV, Nestle, NSW Government, P&O, Peoples Construction Bank of China, Pioneer Japan, Porsche, Rhone Poulenc, Ryvita, Safeway, Sandoz, Sanyo, Scania, Schwarzkopf, Sega, Shell, Smith Kline Beecham Pharmaceuticals, Target, TDK, Thomas Miller, Toshiba, Triumph, Union Bank of Switzerland, Volvo, WD & HO Wills, Wedgwood, Yamaha, Yamaichi Bank, Yardley Lentheric

A cross section of LANSA client/server customers

Rapid response time with LANSA

A rapid response time is essential for a successful client/server application. LANSA client/server applications offer the fastest response times available:

- **Rapid commercial transaction performance**
  LANSA has extensive AS/400 expertise and is able to take advantage of the unique proprietary IBM AS/400 strengths for commercial transaction performance. While ODBC and SQL have been primarily designed as query languages for retrieving and summarizing large amounts of data, LANSA has also been optimized for the types of activity more commonly required by transaction systems - the retrieval and update of single records or small numbers of records. Customers are frequently amazed at LANSA's response times, providing production system responses to the AS/400 faster than local PC database access.

  LANSA 4GL is compiled to achieve native performance in RPG on the AS/400 and C on other platforms.

- **Minimized network load**
  Client/server applications should be designed to minimize the network load that otherwise often cripples implementations. With LANSA, client/server applications can easily call stored procedures on the AS/400 and return results to the client application.

  LANSA applications can also be flexibly partitioned to optimize for the often different performance strengths of client and server platforms.

- **Extensive customer experience**
  Substantial experience has been gained in building rapid response time applications with LANSA. This experience can be applied and adapted to your unique situation.

Rapid response to change with LANSA

Application requirements continually change and so do technical possibilities. LANSA offers significant advantages in allowing customers to rapidly respond to change:

- **Centralized Object Repository and award-winning 4GL to rapidly adapt existing applications**
  LANSA gives you a headstart by readily adapting your existing non-LANSA applications. LANSA's centralized Object Repository means you change business rules once and the effect is inherited across your applications.

- **Technology-independent software to shield complexity**
  LANSA shields developers from underlying complexity. For example, LANSA's stored procedures and triggers are database-independent, allowing the developer to readily move Server-side applications from the AS/400 to other platforms such as Windows NT/SQL Server or HP-UX/Oracle. You can build for a Windows 3.1 and AS/400 environment today and move the Server-side code at the time of your choosing to any combination of Windows 3.1, Windows 95, Windows NT, AS/400, OS/2, IBM AIX or HP-UX. LANSA supports popular commercial Server platforms.

  Network communications complexities are also shielded from developers, offering flexible partitioning of applications across platforms. Both functions and files can be moved without source code change from client to server or deployed in a three-tier client/server application across, for example, Windows 3.1, Windows NT and the AS/400. SQL Server applications gain LANSA's row level locking and other solid commercial benefits of LANSA's experience at commercial transaction processing.

  As your business requirements change, LANSA applications can be rapidly adapted to exploit technical advancements and changing client/server architectures.

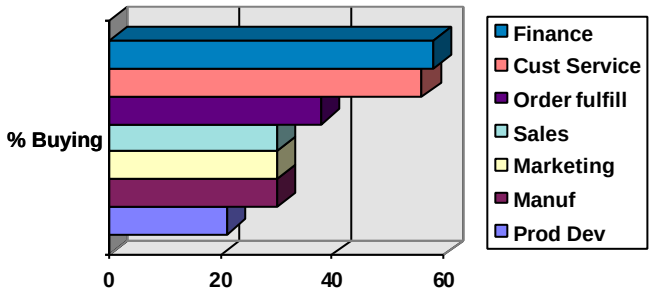
- **Built-in multilingual support allows easy globalization**
  LANSA applications can support multiple languages from a single set of source code and a single compiled version. You don't need multiple versions - one for each language. Multiple language translations can be stored in LANSA's Object Repository and accessed by the same compiled version. Different users in different countries can access the same application in their own unique language, all from the same compiled version.

Key steps to success

1. **Understand the business reasons for client/server**
   The reason for delivering client/server applications is to make critical business processes more flexible and end users more independent. This strongly suggests a very **active role for business users** in the decision and design process. It also suggests a **range of user interface tools**, specific to the task.

2. **Go beyond screenscraping**
   Note that screenscraping does NOT change the nature of the underlying application and does NOT deliver flexible business processes and more independent end users. Flexible business processes require an event-driven design. For example, how can a business user select for cut-and-paste the information required for a business letter if that information is either not available or spread far and wide by the existing underlying application. Screenscraping satisfies the cultural imperative for a Windows-style user interface but does not address the business imperatives.

3. **Analyze and prioritize business areas**
   A Computerworld survey in October, 1995 identified Finance and Customer Service as key areas to develop.



Finance and customer service most need the business process flexibility of client/server. Source: Computerworld, October 1995

Key steps to success

1. **Understand business reasons**
2. **Go beyond screenscraping**
3. **Prioritize business areas**
4. **Match the user interface tool to the user task**
5. **Reuse existing applications**
6. **Conquer the RPG backlog**
7. **Start small with file and print LANs**
8. **Remember the Server in client/server**

Finance needs integrated up-to-date financial information on the health of the business and they need it in the tools they are already using - in a spreadsheet, most likely Microsoft Excel.

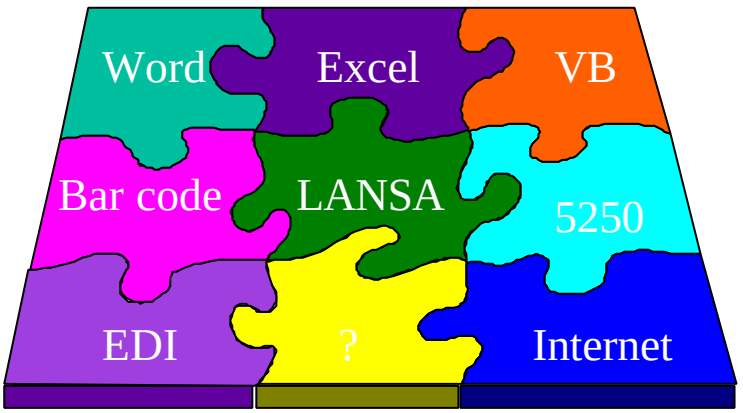
Customer Service covers all activities that affect direct dealings with customers: identifying prospective customers, placing orders accurately and promptly, querying order status easily, providing high quality correspondence. These tasks call for different user interfaces.

Identifying prospective customers may require a flexible query tool to ask a series of “what if” questions. To be successful, a query tool must not only be easy-to-use but the files it queries should be simplified to match the skill level of the user. Refer to the companion white paper “Building a Data Warehouse with LANSA”.

Placing orders, querying stock levels and order status probably require a highly customized client/server application. For example, a bar-code reader may be used to enter orders rapidly. The Windows point-and-click user interface is NOT ideal for high volume order entry which is still best performed by a character-based interface. Many order entry applications are being replaced by Electronic Data Interchange directly between customers and suppliers. The Internet is now emerging as an important and cost effective way of linking world-wide customers directly with ordering processes.

High quality correspondence means integrating business data with a word processor such as Microsoft Word. Simple integration let you cut-and-paste information from a client/server business application and paste it into a letter. More complete integration will allow you to select information from an integrated application that automatically pastes it into Word for the user.

1. **Select the right user interface for the task**
   LANSA’s open and flexible approach to user interfaces is a strong advantage in building client/server applications. You are able to use the user interface tool that best suits the task. Any tool that can call a DLL can be used. Word, Excel, Visual Basic, Visual FoxPro, PowerBuilder are popular choices depending on the application need.



A variety of user interfaces is required to yield user flexibility

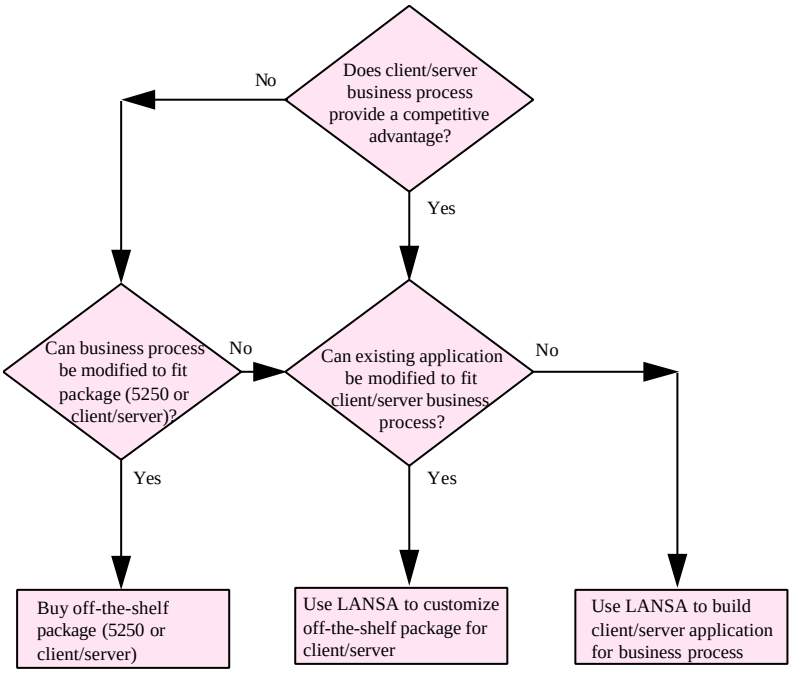
1. **Evaluate and reuse applications (both AS/400 and PC)**
   Companies have invested much in existing applications. It makes sense to reuse as much of that as possible to avoid costly new development.

   Given that not every area needs to be made client/server, many AS/400 packages can continue doing what they are already doing well.

   For areas identified for client/server enablement, ask the software vendor if they have a client/server version. Ensure that it is a true client/server application and not simply a screenscraped 5250 application. You want an application that will work with your current data but that uses more flexible business processes. The underlying data definitions should be reusable. It is the business logic which needs to change to be more flexible.

   LANSA can work with existing AS/400 applications and allows customers of standard packages to easily tailor them to gain a competitive advantage.

   Companies have purchased packages for PCs, too. Word and Excel are obvious examples but don't forget products like Crystal Reports, the standard PC reporting tool. Crystal Reports is the standard used by Microsoft in both its developer tools and also in BackOffice. LANSA has also standardized on Crystal Reports for PC reporting.



LANSA helps you gain a competitive advantage by easily customizing standard packages as well as building completely new applications

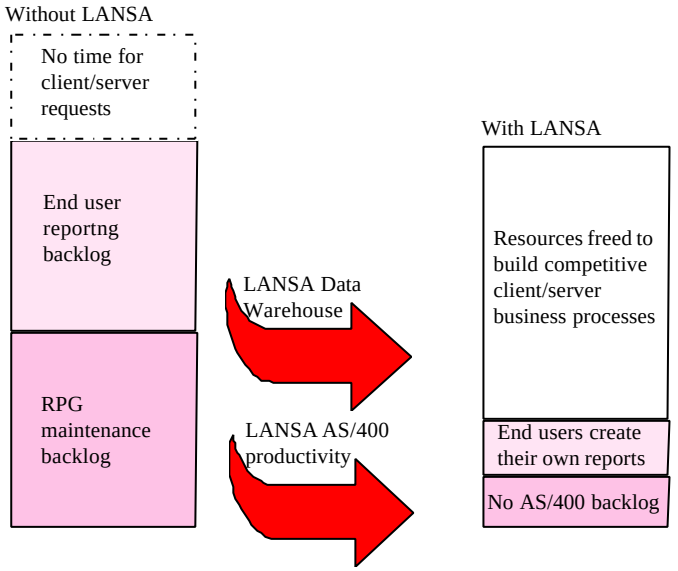
1. **Liberate programming resources by conquering the RPG backlog**
   It may seem too obvious to mention but you can't build client/server applications without programmers and too often they are all allocated to an ever growing RPG maintenance backlog. Arguably the most significant impact of LANSA is to put companies firmly in control of the backlog. LANSA is so much more powerful and productive than RPG. It frees programmers to focus on client/server.

   Typically, the RPG programmers understand the business processes and have a good understanding of what needs to be done to make them more flexible. This knowledge needs to be matched with a good understanding of user interfaces to build effective client/server applications. Experience proves it is easier to teach user interfaces than to teach a novice about the complexities of business.

   Another way to free resources is to use a query tool to share the reporting workload with business users. Refer to the "Building a Data Warehouse with LANSA" white paper for guidelines on how to successfully offload reporting. Files must be simplified to reduce the need for support.

1. **Start small with file and print LAN serving**
   Implementing a file and print LAN allows RPG-skilled staff the opportunity to learn effective PC skills before embarking on more ambitious client/server applications. It also allows time to learn effective LAN administration skills and establish site standards before they are stressed by deploying production client/server applications.

Are your programmers too busy with maintenance?



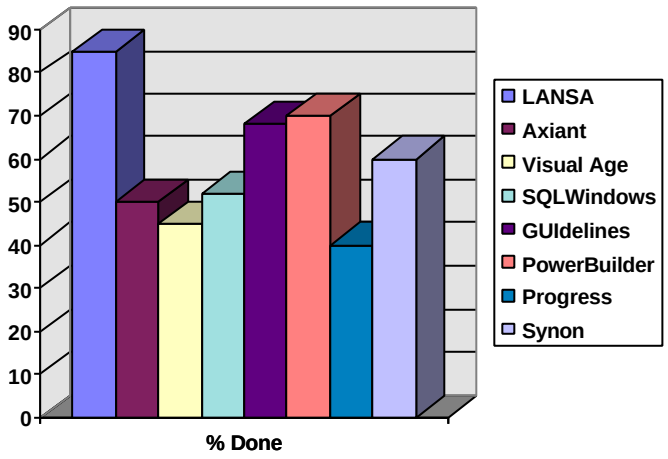
LANSA lets you conquer your application backlog, freeing resources to implement client/server business processes

2. **Remember the Server in client/server**
   PC and AS/400 architectures are fundamentally different. The AS/400 is a high performance integrated database machine. The PC has a highly graphical user interface but, because of its simplistic CPU/bus architecture, it performs database I/O slowly. Also, network communications are much slower than either the PC or the AS/400.

   Applications should make use of the AS/400 for complex data processing and to minimize network traffic. Use the PC to provide a highly graphical user interface.

   Some applications may call for a database on the PC for, say store and forward real-time data capture that is batched to an AS/400 at a later time. SQL Server on Windows NT is a much better architecture for such applications than a Windows 3.1 system.

   LANSA offers significant performance benefits because of the native performance on each platform and because a single set of source code can be deployed to either the client, the server, or a middle tier depending on developer choice. It is often difficult to predict the performance of a client/server application and this flexibility allows parts of an application to be easily moved to optimize performance. An AS/400 application may be enhanced for client/server today and later those enhancements can be migrated to Windows NT using the easy LANSA portability.



LANSA easily won the IBM client/server "shootout" in 1995. Source: JIS Solutions

LANSA family of products

LANSA/Server- unlock the power of your Server

LANSA/Server is intelligent communications middleware, providing lightning fast access to Server data.

- **Use any front-end Windows GUI tool** that can call a DLL. Advanced client/server and Enterprise Information Systems can be easily built and customized. Visual Basic programmers can concentrate on what they do best - defining the GUI using LANSA's friendly data definitions. Your Server data is protected by LANSA's security and data validation rules.

    - **ACE** rapidly builds Visual Basic applications.

    - **PASIVA** rapidly builds PowerBuilder applications.

- **Extend any existing AS/400 application** by easily defining the files to the **LANSA Object Repository** which can transform a relational database into a database-independent business rules and database layer with business rules being portable across multiple Server platforms.

- **Use 16-bit LANSA/Server** to access Server data directly from Windows 3.1 applications or across a Windows NT gateway using Microsoft SNA Server or any other CPI-C or PC Support compliant router.

- **Use 32-bit LANSA/Server** to access Server data directly from Windows 95 or Windows NT using Microsoft SNA Server or any other CPI-C or PC Support compliant router.

- **LANSA/Client,** LANSA's query tool, uses LANSA/Server to rapidly access Server data.

LANSA/CS400 - fast and simple creation of multiple platform client/server applications

- **All the benefits of LANSA on the AS/400 but for multiple platforms** LANSA/CS400 is an advanced 32-bit development environment running on your choice of Windows 95, Windows NT or OS/2. LANSA/CS400 supports application deployment from a single set of source code to any combination of AS/400, Windows 3.1, Windows 95, Windows NT, OS/2, IBM AIX and HP-UX.

- **Flexible application partitioning shields platform complexity**
  Functions and files can be moved without source code change across any combination of supported platform.

- **Works with any GUI tool**
  While LANSA's GUI is portable across Windows and Server-side platforms you can also use your choice of GUI-side development environment with LANSA. You gain the best of both worlds - LANSA's commercial application strength and your choice of the most appropriate user interface whether it is Microsoft Word for a flexible telemarketing application or Visual Basic or PowerBuilder for customized commercial applications.

LANSA/AD - fast and simple AS/400 Server applications

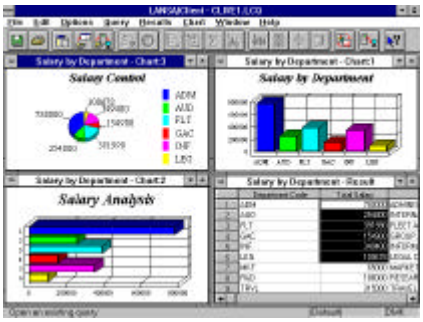
LANSA/AD contains a powerful 4GL for building AS/400 Stored Procedures. In 1995, the leading newspaper *Midrange Systems* voted LANSA the AS/400 4GL of the year.

- **Transform non-relational AS/400 data** - LANSA is particularly well suited to working with existing databases whether they were initially created by LANSA or not. As well as normalized database files (managed by DB2 for OS/400), LANSA can work with virtually all native AS/400 files, including System/36 files, multi-member files and multi-record format files.

- **Simplify files** - LANSA allows you to define business-friendly terms, automatic file navigation, pre-determined joins and Help text that can be reused by both business users and programmers alike. The same definitions that make LANSA/Client a productive and easy to use data access tool for business users, are available for reuse by application programmers when creating customized applications.

- **Powerful stored procedures and triggers** extend native AS/400 capabilities to provide database-independent facilities that can be ported from DB2 for the AS/400 to SQL Server for Windows NT, Oracle for HP-UX, DB2 for OS/2, DB2 for AIX or any ODBC-compliant data source.

- **Centrally defined Object Repository-maintained business rules** ensure application consistency and provide vastly improved productivity. The Object Repository also defines domain and referential integrity, error messages, help text and multilingual definitions.



LANSA/Client - turning data into information

LANSA/Client is an easy-to-use query, reporting and charting tool for accessing Server data.

- **Familiar business terms** - Repository-defined field and file descriptions present terms familiar to business users.
- **Report templates** - users can run standard reports or readily view and tailor reports.
- **File simplification** - users can view simple consolidated/denormalized Data Warehouse files (prepared either by LANSA or other tools) or use LANSA's predefined file joins to view many files as one file.
- **File filtering** - users can reduce the number of files to be viewed with file filtering.
- **Automatic joins** - users can simply select fields from multiple files to create a consolidated report.
- **Drill downs** - users can simply drag and drop to access a link and drill down between files.
- **Prototype the Data Warehouse by creating** multi-dimensional databases on the client PC with dynamic regrouping at the click of the mouse.
- **Ability to share data** with other PC tools such as spreadsheets.
- **Windows 3.1** support.

LANSA Rapid User Object Modeling

LANSA uses object-oriented modeling to rapidly create prototypes or whole new systems:

- **Fully integrated with LANSA**
  The object modeler creates Object Repository, database and program definitions.
- **PC-based or AS/400 modeling**
  Source model is portable between either AS/400 object modeler or PC-based modeler.

LANSA client/server services

Aspect Computing, the developer of LANSA, reported revenues for 1995 of A$ 75M. Marketed in over 60 countries, LANSA is a member of IBM's Application Development Program and the Client Series. Aspect Computing is also a member of Microsoft's BackOffice ISV program and a Microsoft Solution Provider and Authorized Technical Education Center.

A range of services are available from your local LANSA distributor to support the implementation of effective client/server applications:

- **LANSA Launch**
  LANSA Launch is a packaging of LANSA client/server products, education and implementation services designed to get you up and running with your first client/server application as rapidly as possible. It leverages the vast experience of over 2,000 successful LANSA client/server customers.

  Special assistance is available for software application vendors to enable their existing AS/400 packages for a broader client/server market including support for multiple Server platforms such as Windows NT, IBM AIX and HP-UX.

- **Data Warehouse Services**
  Use LANSA's Repository to simplify your existing system with its embedded arrays, internally described data and multi-member files, all without impacting existing applications. Business users can then easily access the simplified files.

  Other services analyze your existing transactional system and business data access needs to propose an effective Data Warehouse design for business user data access. This includes identification of the most suitable pilot subject area, creation and maintenance of summary files triggered by operational updates, and a proposed implementation plan.

This is only a subset of the LANSA services available. Please contact your local LANSA distributor for a complete list of LANSA products, courses and documentation available.