Microsoft Dynamics GP 2013 R2

Architecture

White Paper

This document describes the architecture for Microsoft Dynamics GP.

Date: May 2014

Microsoft Dynamics

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Introduction

This document describes the architecture for Microsoft Dynamics GP. It explains how the architecture's features make Microsoft Dynamics GP an excellent solution for organizations implementing a business management system today. The document also describes how the architecture allows Microsoft Dynamics GP to grow with these organizations in the future.

Client Types

Microsoft Dynamics GP supports both a desktop client and a web client. A Microsoft Dynamics GP installation can support both types of clients.

Desktop client

The desktop client is a Windows application that presents Microsoft Dynamics GP to the user. This is the traditional way that users have accessed Microsoft Dynamics GP.
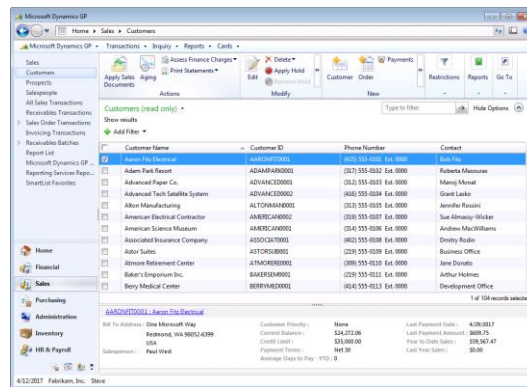
For single-user installations, all components are installed on a single workstation. For multi-user installations, the Desktop Client Runtime engine and Microsoft Dynamics GP application dictionary are installed on individual workstations. Data for the system is managed by a separate server.
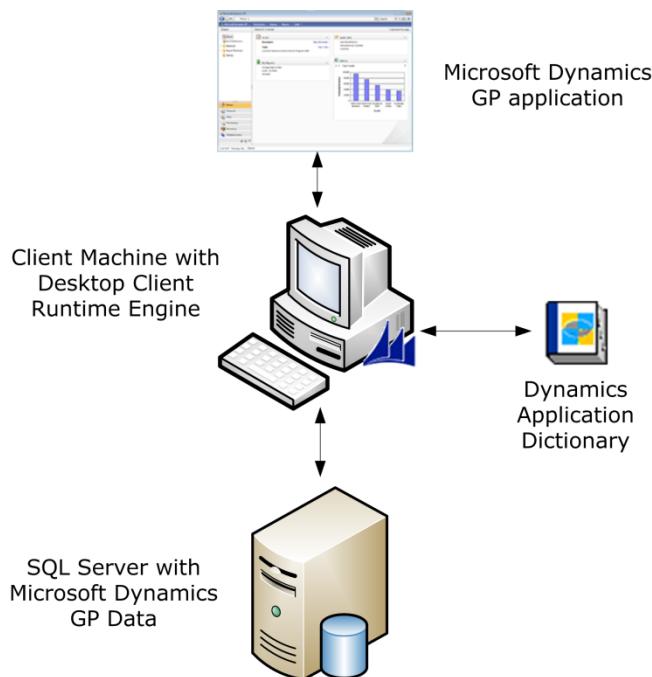
Web client

The web client provides access to Microsoft Dynamics GP through the Internet Explorer web browser. The user experience and functionality provided by the Microsoft Dynamics GP web client closely matches the experience of using the Microsoft Dynamics GP desktop client.
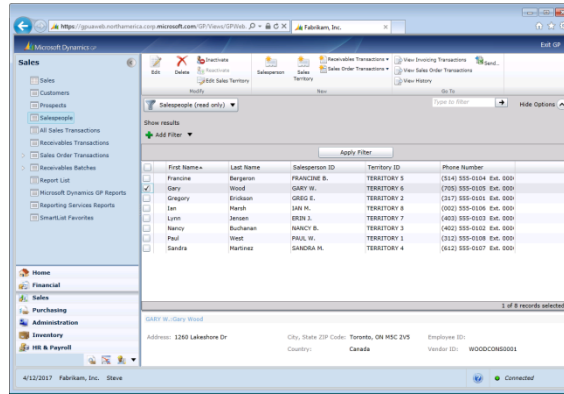
No client application software is installed on the user's local system. The Microsoft Dynamics GP application process for the user is running on a separate session host server. A Silverlight 5 application running inside the web browser on the user's computer presents the application.

In a typical web client installation, a client machine running Internet Explorer accesses a web server to connect to the Microsoft Dynamics GP web client. The Web Client Runtime on one of the session host machines manages the web client session. The web client session accesses Microsoft Dynamics GP data managed by the SQL Server.

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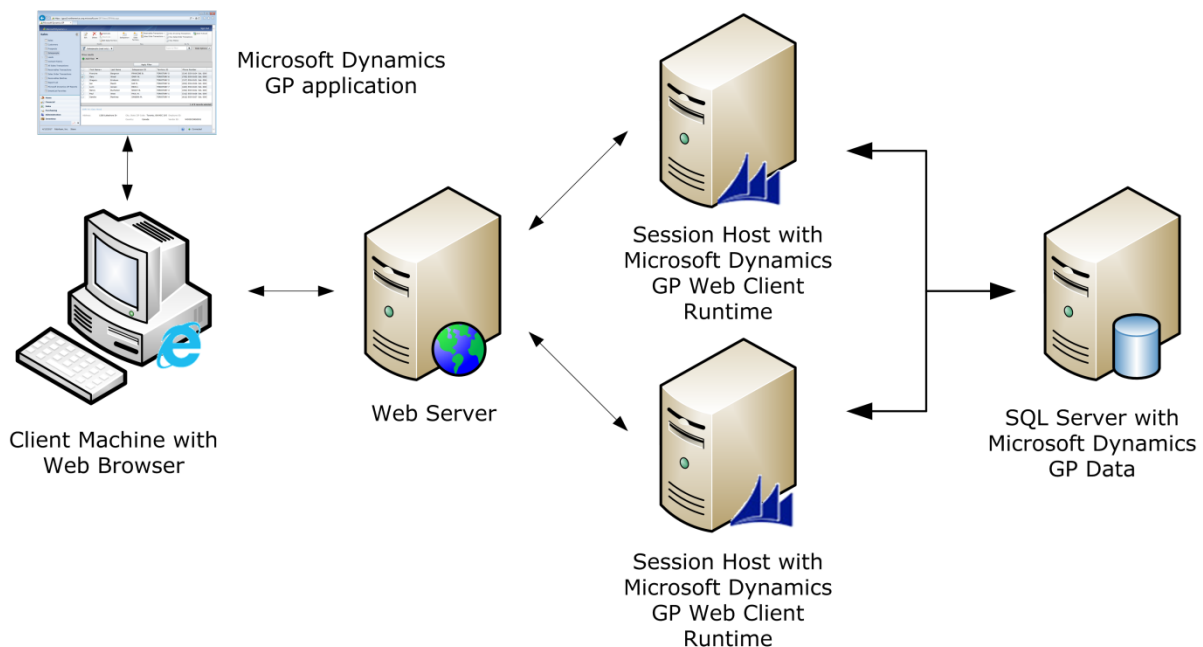
Parts of the system

The Microsoft Dynamics GP application is composed of the following major parts:

- Dexterity and the Dexterity runtime engines

- Dynamics application dictionary

- Microsoft SQL Server database

Dexterity and the Dexterity Runtime Engines

Dexterity is the development tool used to create the Microsoft Dynamics GP application. The runtime engines present the Microsoft Dynamics GP application to the desktop client user or the web client user. Microsoft Visual Studio is the development tool used to create Dexterity and the runtime engines.

Dexterity and the Dexterity runtime engines are mixed-mode applications, containing both Win32 code traditionally used for Windows applications, as well as managed code. The mixed-mode application allows Microsoft Dynamics GP to use the capabilities of the .NET Framework to provide features like an enhanced user interface and a .NET programming interface that is used by integrating applications.

Dexterity

Used by the Microsoft Dynamics GP development team, Dexterity is a complete integrated development environment. Its features include:

Feature	Description
Graphical forms designer	A WYSIWYG layout window used to design forms visually.
sanScript scripting language	An English-like scripting language used to add business logic to the application.
Extensive function library	Hundreds of special-purpose functions allow implementing key functionality in an application.
Integrated script debugger	Allows interactive debugging of an application.
Structured exception handling	A built-in mechanism for dealing with unexpected conditions in the application.
COM support	Excellent access to features made available by other applications through COM.
Integrated Source Code Control	Built-in support for managing application resources using Microsoft Visual SourceSafe or Team Foundation Services (TFS).
Built-in Report Writer	A WYSIWIG report layout tool used to design reports.

Dexterity is designed to remove complexity from the development process, allowing the developer to focus on the application being created. Any capable software developer will find Dexterity easy to learn.

Desktop Client Runtime Engine

The desktop client runtime engine displays the functioning application to the end-user as a Windows desktop application. It provides the basic capabilities used by the Microsoft Dynamics GP application, such as:

- The main application shell

- The user interface subsystem

- The data subsystem used to access the SQL database.

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The runtime also provides additional tools and technologies available for Microsoft Dynamics GP. For example, the Modifier, Report Writer, Visual Basic for Applications (VBA) environment, .NET programming interface, and COM programming interface are just some of the tools and technologies provided by the runtime engine.

Web Client Runtime Engine

The web client runtime engine runs on the session host server for the web client installation. It manages the application session for each web client user. The web client runtime engine communicates with the Silverlight application that is presenting the Microsoft Dynamics GP application to the user through Internet Explorer. The connection to the SQL database is also managed by the web client runtime engine.

The web client runtime engine is highly optimized so that it can efficiently transfer data between the session host machine and the Silverlight application that is running in the web browser. Caching functionality provided by the web client runtime engine helps improve web client performance.

Dynamics Application Dictionary

The Dynamics application dictionary contains the resources and business logic for the core application. Separating the business logic from the application presentation helps insulate the application from technology changes. For example, integration technologies such as VBA and the .NET programming interface can be added to the Dexterity runtime engine without affecting business logic.

The internal structure of the application dictionary has been carefully designed. It uniquely identifies and separates resources into the various types to allow the following:

- End-users can modify the appearance of forms and reports in the Microsoft Dynamics GP application without impacting the business logic.

- User-visible resources like strings and messages can be extracted from a dictionary, translated to another language, and replaced. The business logic in the dictionary is unaffected.

- Special files can be used to update resources in an application dictionary after it has been deployed.

- Third-party integrations can reuse resources from the main Dynamics application dictionary. This is especially helpful for developers who use Dexterity or Visual Studio Tools for Microsoft Dynamics GP to create their integrations.

The Multidictionary Architecture section later in this document describes how software developers can use this capability to produce add-on applications for Microsoft Dynamics GP.

Microsoft SQL Server

Microsoft Dynamics GP uses Microsoft SQL Server to store and manage data for the application. Microsoft Dynamics GP is designed and optimized for SQL Server, using key features to maximize performance, ensure data integrity, and improve security.

Stored Procedures

Stored procedures are a core feature of SQL Server used to improve application performance. Typically, stored procedures are hand-coded to perform specific tasks that can be run directly on the SQL server. Microsoft Dynamics GP uses several stored procedures to perform data-intensive tasks, such as posting.

Microsoft Dynamics GP also employs an innovative approach for SQL stored procedures to optimize performance for all database actions in the application. The Dexterity runtime engine examines the table structures defined in each application dictionary, and automatically generates stored procedures for each table. These "auto-generated" stored procedures are called automatically by the runtime engine to optimize the data operations performed on each table. The performance benefit of stored procedures is achieved without the tedious hand-coding.

SQL Transactions

SQL transactions help ensure data integrity as an application processes data. If an entire transaction cannot be completed, it is rolled back. This leaves the database in its previous state, as if the transaction had not been attempted. Any Dexterity-based application can use SQL transactions. They are used in key areas of Microsoft Dynamics GP, especially in critical areas such as posting.

SQL Login Security

Microsoft Dynamics GP utilizes the password security features available in SQL Server. Users can be required to change their password the first time they log into Microsoft Dynamics GP. The password policy set up for the Windows domain can also be enforced when the user chooses a new password.

The Microsoft Dynamics GP administrator can choose to enable the "Remember User" feature. This feature securely stores the SQL password for the current Windows account, allowing the user to access Microsoft Dynamics GP desktop client without having to supply the SQL password each time they log in.

SQL Server Scheduled Jobs

SQL Server Scheduled Jobs are another feature used by Microsoft Dynamics GP. From within Microsoft Dynamics GP, you can set up Business Alerts that notify you when specific conditions exist in your accounting data. Business Alerts are based on SQL Server Scheduled Jobs.

Performance and Scalability

Microsoft Dynamics GP is designed to support a large number of simultaneous workstations, while still providing a responsive application for the end-user. It is also designed to efficiently use system resources for both client workstations and servers.

Workstation Performance

Microsoft Dynamics GP uses several techniques to help ensure that workstations are responsive for users of the system. The following are some of the techniques applied.

Optimistic Concurrency

Microsoft Dynamics GP implements optimistic concurrency. This is a form of row locking that allows multiple users to work in the same tables and access the same rows with minimal restrictions, while helping ensure data integrity. Optimistic concurrency reduces the chance that a user will be prevented from accessing data in the system because that same data is being accessed by another user. Support for optimistic concurrency is built into the Dexterity runtime engines, making it easy to implement throughout the Microsoft Dynamics GP application.
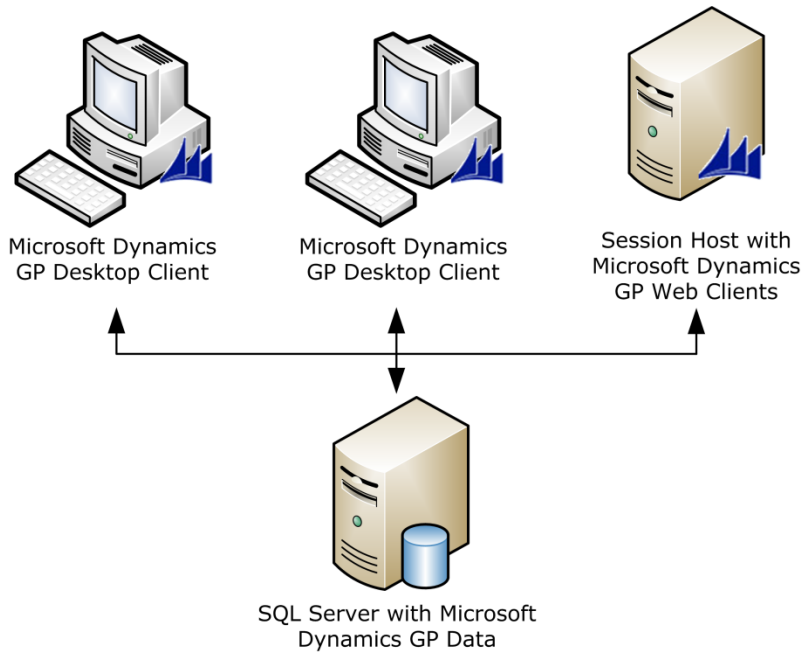
Index Design

The indexes for tables in Microsoft Dynamics GP are carefully designed to optimize performance. For example, the Dexterity runtime engines support clustered indexes for SQL Server. With a clustered index, data in a table is sorted and physically stored in a specific order as indicated by the index definition. Clustered indexes are used for specific tables in Microsoft Dynamics GP where analysis has shown that the clustered index results in improved performance.

Background Processing

Many processes in Microsoft Dynamics GP are data-intensive, and can take more time to process than a typical user is willing to wait. To avoid having these processes take over the workstation, Microsoft Dynamics GP uses the background processing capabilities of the Dexterity runtime engines. When data-intensive processes are sent to the background processing queue, the workstation is available for the user to perform other tasks. The tasks sent to the background are processed when time is available for the system.
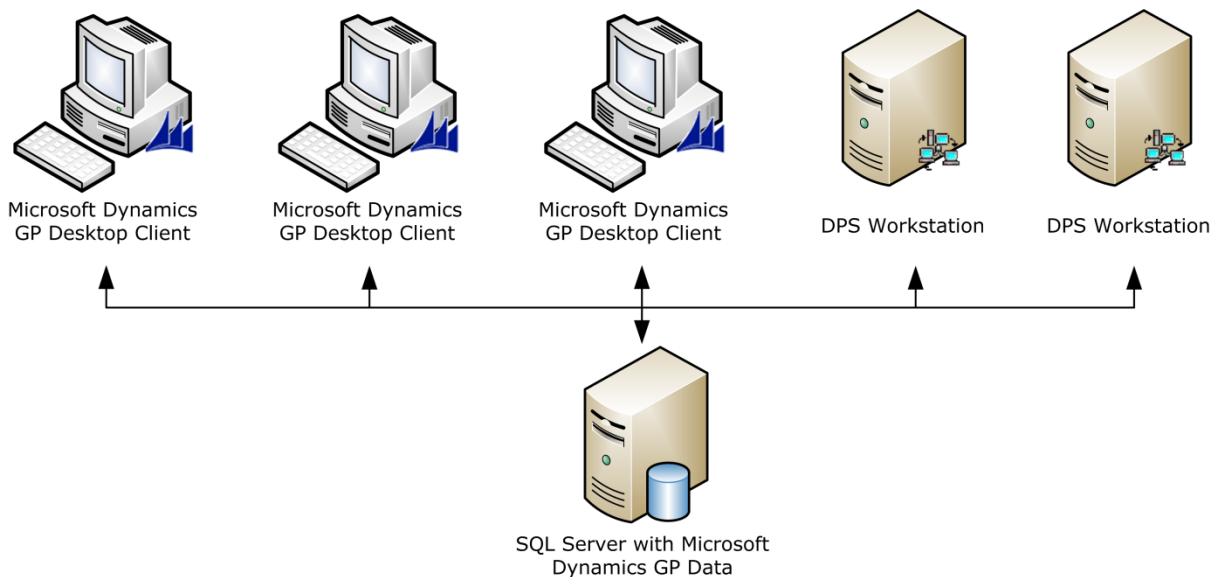
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Server Performance

The Microsoft Dynamics GP architecture is designed to make optimal use of the SQL Server managing data for the accounting system. In many cases, the SQL Server will have better throughput when the overall workload is spread over several clients, rather than concentrated on just a few.

Microsoft Dynamics GP Desktop Client Microsoft Dynamics GP Desktop Client Session Host with Microsoft Dynamics GP Web Clients

SQL Server with Microsoft Dynamics GP Data

Distributed Process Server

The Distributed Process Server (DPS) is a special version of the Dexterity runtime engine that runs on a separate workstation. Other workstations can send process-intensive tasks to be run on the process server. This frees the workstation sending the task, and helps spread the overall processing load to more workstations. This also helps achieve optimal performance for the SQL Server.

Microsoft Dynamics GP Desktop Client Microsoft Dynamics GP Desktop Client Microsoft Dynamics GP Desktop Client DPS Workstation DPS Workstation

SQL Server with Microsoft Dynamics GP Data

Distributed Process Manager

If multiple Distributed Process Server systems are used, optimal processing performance is achieved when the processing load is evenly distributed across them. The Distributed Process Manager (DPM) is an application included with Microsoft Dynamics GP that implements load balancing across several workstations running the DPS. When a process is sent from a workstation, the DPM will direct the job to the process server with the lowest current processing load.
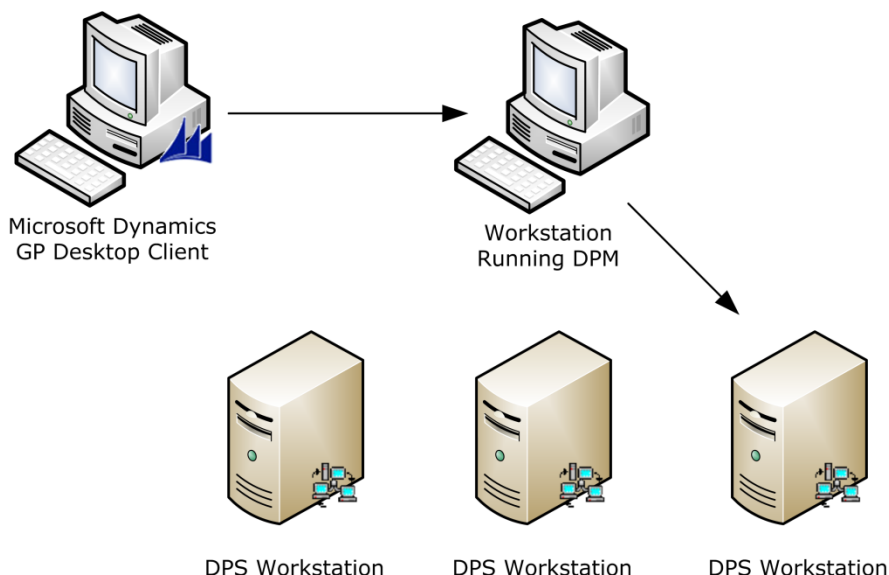
Customization

Organizations and individuals have unique needs, so Microsoft Dynamics GP is designed to be customized. Some customization features are built directly into the software, and are accessible to all users. Other customizations require additional tools and are typically implemented by the system administrator.

End-user Customizations

Several end-user customizations are available in Microsoft Dynamics GP, allowing users to adjust the application to their liking. The following table lists some of the customizations available:

Customization Feature	Description
Home page	Each user can specify the content of the Home page in Microsoft Dynamics GP.
Area pages	Each user can specify the visibility and arrangement of the sections in each Area page.
Toolbars	Users can specify which toolbars are displayed, what buttons they contain, and where they are positioned.
Navigation Pane	Users can select which groups they want to display in the Navigation Pane.
Shortcuts	Users can add items to the shortcut bar, giving them quick access to areas of the application important to them.
Lists	The lists displayed in the main window for Microsoft Dynamics GP are configurable, allowing users to specify which columns to display and the order they are presented. Filters can also be applied to list data.
Action Pane	The groups and actions shown in the Action Pane for each list are configurable. Actions and groups can be rearranged or removed. New groups can be created. Additional actions can be added that are appropriate for each specific list.

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Modifier

The Modifier allows the appearance of windows in Microsoft Dynamics GP to be modified. For example, a field that isn't used can be hidden to simplify the window. Other cosmetic changes can be made with the Modifier, such as changing an image displayed in the system, or the text that appears in a message. The Modifier works with any Dexterity-based product that integrates with Microsoft Dynamics GP. Security settings in Microsoft Dynamics GP determine whether a specific user will see the modifications that were made.

Modifications made with the Modifier are stored in a separate dictionary, not the application dictionary. This ensures that business logic is not affected by the changes. For Microsoft Dynamics GP, the Forms.dic dictionary stores the modifications made using the Modifier.

Dynamics
Application
Dictionary

Forms
Dictionary

Modifications made with the Modifier can be exported to special "package" files. These package files can be imported into other Microsoft Dynamics GP installations, making it easy to copy modifications from one workstation to another.

Report Writer

The Report Writer allows the layout and appearance of reports in Microsoft Dynamics GP to be modified. For example, a company logo could be added to a report. The way data is presented by the report can also be modified, such as by defining a different sorting order. The Report Writer works with any Dexterity-based product that integrates with Microsoft Dynamics GP. Security settings in Microsoft Dynamics GP determine whether a specific user will use the modified version of a report.

Changes made with the Report Writer are stored in a separate dictionary, not the application dictionary. This ensures that the original report in unaffected by the changes made with the Report Writer. For Microsoft Dynamics GP, modified reports are stored in the Reports.dic dictionary.

Dynamics
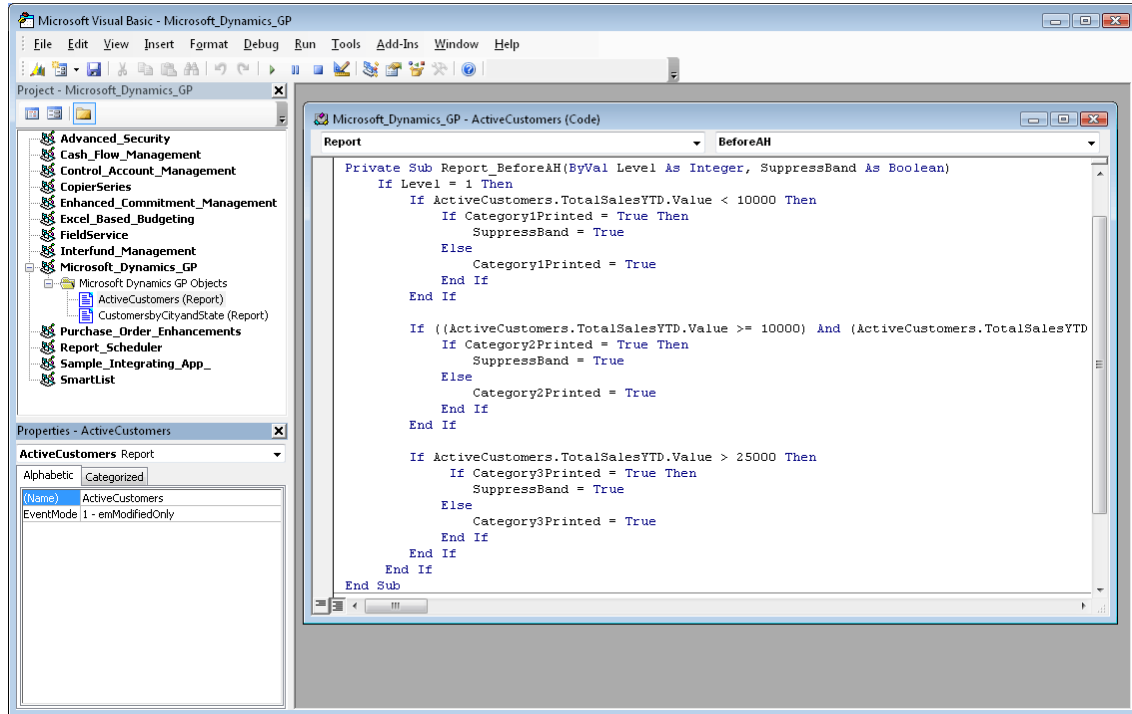Application
Dictionary

Reports
Dictionary
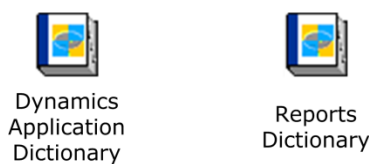
Modifications made with the Report Writer can be exported to special "package" files. These package files can be imported into other Microsoft Dynamics GP installations, making it easy to copy modifications from one workstation to another.

The Report Writer can also be used to create new reports. While Microsoft Dynamics GP provides numerous detailed reports, the specific information an organization needs may not be presented in them. You can use the Report Writer to create a custom report that presents the data needed.

Visual Basic for Applications (VBA)

The Visual Basic for Applications environment is available in the Microsoft Dynamics GP desktop client when the Modifier has been registered. This is the standard VBA environment that is found in other Microsoft products, such as Office. With VBA, you can use standard Visual Basic syntax to add additional business logic to Microsoft Dynamics GP windows and reports. New Visual Basic forms can be added, allowing additional capabilities to be added to the accounting system. The following illustration shows the VBA environment in Microsoft Dynamics GP:

Third-party integrating applications created with Dexterity can also be modified using VBA.

Update Support

With all of the customization options available to them, users can spend considerable time modifying Microsoft Dynamics GP. When updates for Microsoft Dynamics GP are released, it's important that these customizations are preserved. The Dexterity runtime engine contains special code that works to preserve changes that users have made with the Modifier, Report Writer, and VBA, protecting your time investment.

Third-party Integrations

The tools used to create third-party integrations to Microsoft Dynamics GP can also be used to make customizations. For instance, a Dexterity-based application can make extensive customizations to the Microsoft Dynamics GP application. These types of integrations can even replace entire forms and reports in the main application.

The .NET programming interface and the COM programming interface (called Continuum) available in Microsoft Dynamics GP allow external applications to customize Microsoft Dynamics GP. For example, an application written with Visual Basic could use Visual Studio Tools for Microsoft Dynamics GP and the .NET programming interface in the runtime engine to modify the appearance of a form.

Data Integration

A vital issue with any accounting application is the ability to import data into and export data from the system. The Microsoft Dynamics GP architecture provides several ways to accomplish this task. The following illustration shows how the data integration tools available access Microsoft Dynamics GP data.
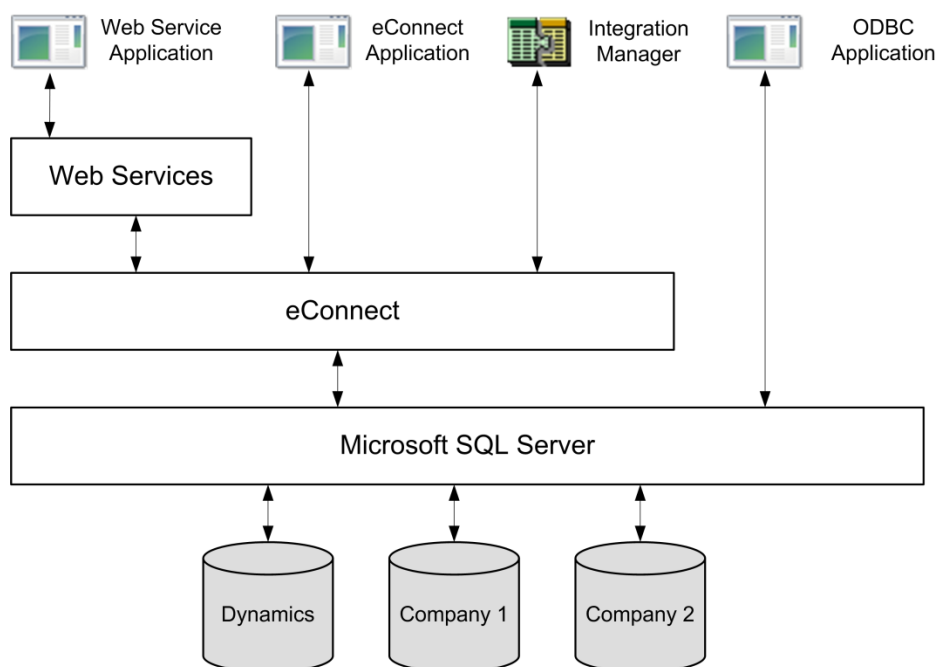
eConnect

The primary platform for importing and exporting data from Microsoft Dynamics GP is eConnect. eConnect is a special set of SQL stored procedures that are installed on the SQL Server managing Microsoft Dynamics GP data. These stored procedures allow data to be imported into or exported from tables in the accounting system. Logic in these stored procedures ensures that only valid data can be imported.

eConnect serves as a data access platform. Other data integration options, such as Web Services for Microsoft Dynamics GP and Integration Manager, use eConnect to provide their core capabilities.

eConnect uses XML documents to import or export data. These documents must conform to a special schema that defines the structure of each type of document that can be imported or exported.

Several standard programming interfaces are included with eConnect. The following table lists them:

Programming Interface	Description
eConnect .NET Assembly	The .NET interface used to interact with eConnect.
Microsoft Message Queue (MSMQ)	Provides a loosely-coupled, message-based interface for eConnect.
eConnect Integration Service	A Windows Communication Foundation (WCF) service that enables you to perform specified operations using eConnect XML documents.
SQL Stored Procedures	The stored procedures defined by eConnect, which can be used directly.

The programming interface you choose will depend on the type of application you are integrating to Microsoft Dynamics GP, and the tools you are using to create the integration.

Web Services

Web Services for Microsoft Dynamics GP can be installed to provide a standard web service interface to access data in the accounting system. Through the web service, integrating applications can retrieve documents, create new documents, update existing documents, and delete or void documents. The primary documents in the system can be accessed. The following are some of the documents that are available:

- Customers

- Vendors

- Sales documents

- Purchase documents

- Receivables transactions

- Payables transactions

- General ledger transactions

- Accounts

Web services use standard Internet transport protocols such as Hypertext Transfer Protocol (HTTP) and standard XML-based document formats such as Simple Object Access Protocol (SOAP) to exchange information. Windows Communication Foundation (WCF) is the foundation used to implement the Web Services for Microsoft Dynamics GP. It provides the support for the standard protocols that make the web service accessible. The Dynamics GP service uses eConnect to provide access to the data managed by the accounting system.

Web Services for Microsoft Dynamics GP is an essential tool that can help you integrate Microsoft Dynamics GP data into any Service Oriented Architecture (SOA) that you are creating for your organization.

Integration Manager
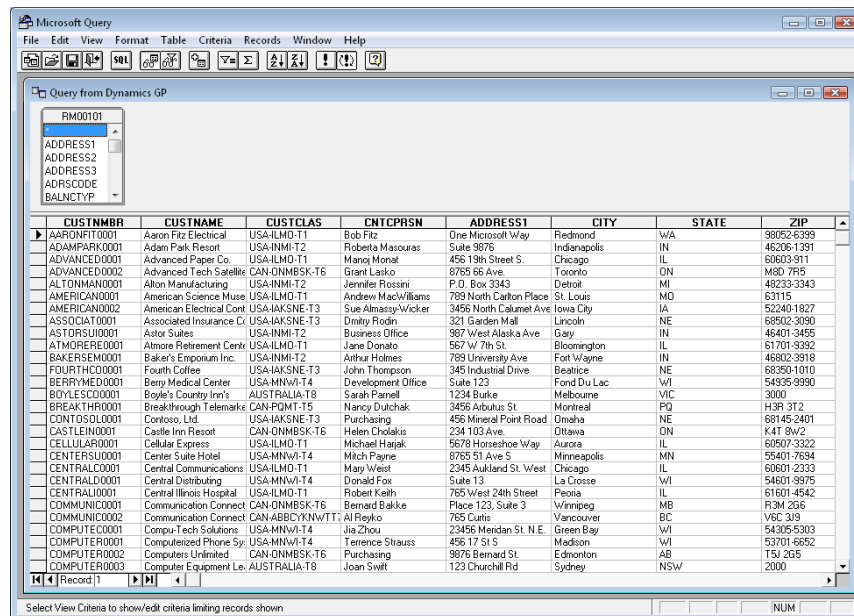
The Integration Manager is a separate application used to import data into Microsoft Dynamics GP. The data can come from various sources, such as text files or Microsoft Excel spreadsheets. A graphical interface in the Integration Manager makes it easy to map items in the source data to the destination object in Microsoft Dynamics GP, such as a Sales Order Processing document. All data imported by the Integration Manager is validated, helping to ensure the integrity of the accounting system.

The Integration Manager is very flexible while importing data. Only required fields must be supplied. Non-essential fields have default values that will be used if no value from the source is specified. This greatly simplifies mapping complex objects.

The scripting system built into the Integration Manager allows further customization. Scripts (written in VBScript) can be attached to various events in the integration process. For instance, as values are imported from the source documents, a script can set the value of a field in the destination object based on the value of another source field in the integration.

ODBC

Microsoft Dynamics GP uses a standard ODBC interface to access the data managed by SQL Server. This same ODBC interface can be used by other applications to securely access data in the accounting system. Applications such as Crystal Reports or Microsoft Query use the ODBC interface to access data. The following illustration shows Microsoft Query accessing data in Microsoft Dynamics GP through ODBC.

The ODBC interface requires a more sophisticated developer to set up and use, especially when data is being written to the Microsoft Dynamics GP database. Knowledge of the Microsoft Dynamics GP database and table structures is essential. No data validation is performed when using ODBC, so the application writing data to Microsoft Dynamics GP tables must ensure that correct data is being saved. Information about tables and data flow is available in the Microsoft Dynamics GP SDK. Table structure information is available through the Resource Descriptions tool included with the Microsoft Dynamics GP desktop client.

Platform Features

The following are some of the key platform features that provide unique functionality for Microsoft Dynamics GP.

Flexible Account Number

Most organizations that implement Microsoft Dynamics GP have unique requirements for account numbers. To provide flexibility in this key area, the Dexterity runtime engine supports a special data type called a composite. A composite is a grouping of several related fields that act together as a single field in the system. Using a composite for the account number allows it to appear as a single item throughout the application's windows and reports.

The following illustration shows the Account field in Microsoft Dynamics GP. This specific account number is nine characters long, with three segments.

The structure of the account number is defined when Microsoft Dynamics GP is installed. The number of segments in the account number and their length can be specified. Composite fields can display scrolling arrows so that long account numbers can be accessed, but not use excessive space when displayed on a window.

Lists

The lists in the main window in Microsoft Dynamics GP provide a central location to access data and perform actions in the application. Each list displays a specific type of data, such as customer information or sales transactions. The data in each list can be sorted and filtered. A list containing customer information is shown in the following illustration. The data in this list is being filtered to show customers from Illinois.

The Action Pane at the top of the list displays all of the actions that can be performed for the list. Users simply mark items in the list and choose the action they want to perform. Performing actions with the list reduces the need to open additional windows to complete tasks. The Action Pane is configurable, allowing the actions to be arranged based on the user's needs.

The Information Pane at the bottom of the list shows detailed information about the selected row. This allows the important information to be accessed without having to open a separate window.

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Data-driven Scrolling Windows

An accounting system can have large quantity of data to present to the user, but a limited amount of screen area to display it. For example, a sales invoice can contain dozens of line items, each with additional item detail. Providing a way to enter, save, retrieve, and display this quantity of data is a complex task for the application. To simplify this, the Dexterity runtime engine supports a unique data-driven scrolling window control. Scrolling windows are used throughout Microsoft Dynamics GP in transaction entry windows, list windows, and lookups.
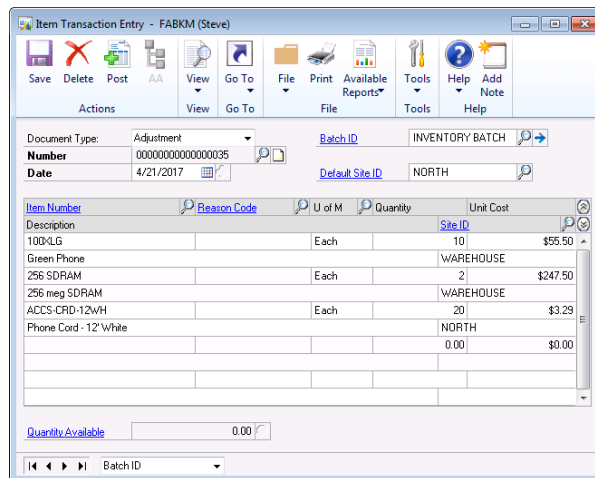

Scrolling windows have direct access to table data, and have been optimized to retrieve data efficiently from the database and display it quickly for the user. Data retrieval, record locking, and data concurrency issues are automatically handled by the scrolling window control. Special techniques ensure that the scrolling window paging and scroll bars work as users expect.

Security

Microsoft Dynamics GP has a flexible, role-based security system that allows the system administrator to control access to forms, reports, tables, and customization tools in Microsoft Dynamics GP. Users have access to only the resources needed to perform specific tasks. Microsoft Dynamics GP also provides activity tracking, which allows the actions performed by users of the accounting system to be tracked and analyzed. Comprehensive security reports help the system administrator manage compliance issues.

Unified Communications

When Microsoft Lync is running on the same system as Microsoft Dynamics GP, the Microsoft Dynamics GP client can integrate with some of the Unified Communications capabilities provided by Lync. Microsoft Dynamics GP can display presence information for specific entities such as customers, vendors, or salespeople.

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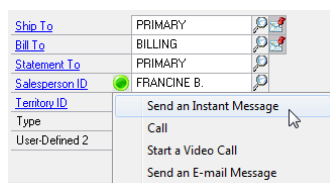
Actions in Lync allow tasks to be performed within Microsoft Dynamics GP. For example, you could choose to create a new sales quote for a contact.
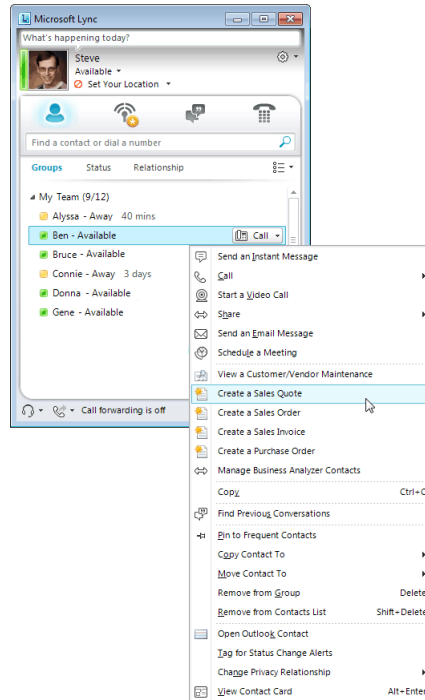
International Support

The Dexterity runtime engine provides features that allow Microsoft Dynamics GP to support transactions in multiple currencies. Microsoft Dynamics GP is also designed to be translated to support other languages.

Multicurrency

To support multicurrency transactions, Microsoft Dynamics GP must be able to display values in different currencies, and perform multicurrency calculations. The Dexterity runtime engine supplies formatting features that allow various currency formats to be displayed on windows and reports. Characteristics like the currency symbol, decimal separator, and thousands separator can be defined for a specific currency, and displayed whenever that currency type is used.

Microsoft Dynamics GP must perform multicurrency calculations when other currencies are used in the system. For example, if the functional currency being used by Microsoft Dynamics GP is US dollars and a transaction value is entered in euros, the value must be converted internally to the functional currency US dollars. The Dexterity runtime provides the variable currency data type to support multicurrency calculations. This special data type has the precision necessary for accurate currency calculations.

Translation

Microsoft Dynamics GP and the Dexterity runtime are designed to be translated to other languages and viewed in other locales. The application dictionary used for Microsoft Dynamics GP stores string and message resources separately. Tools available with Dexterity allow these resources to be extracted from the application dictionary, translated, and then re-added. The business logic is not affected. Special installation files allow merging the localized changes back into the dictionary when Microsoft Dynamics GP is installed for a specific locale.

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Macro System

The Dexterity runtime engine provides a macro system that is designed to allow automated testing for applications like Microsoft Dynamics GP. The Microsoft Dynamics GP development team has created an extensive set of macros that test the functionality of the application. This macro set is run regularly during the development process to ensure that product quality is maintained.

Third-party software developers who create add-on products for Microsoft Dynamics GP use the macro capabilities in Microsoft Dynamics GP to create automated tests for their products. The macro system is also available to end-users in Microsoft Dynamics GP, where it can be used to automate processes in the application.

Named Printers

In certain cases, it is useful to have reports generated from Microsoft Dynamics GP always sent to a specific printer. For example, you may have a printer that contains check stock, and is used only to print checks. You would want checks printed from Microsoft Dynamics GP to be sent to this printer, but not other documents. To support this capability, Microsoft Dynamics GP can define specific printer instances, and always send specified reports to the named printer.

Mail API

Electronic mail is a critical business tool today. It is increasingly common to have accounting documents generated and sent to recipients through email. The Dexterity runtime engine provides a mail API (Application Programming Interface) that allows applications like Microsoft Dynamics GP to generate and send accounting documents to recipients through email.

Microsoft Application Error Reporting

Microsoft Application Error Reporting is the application feedback and diagnostic tool originally implemented in Microsoft Office applications. It allows the application to report serious issues (such as application crashes) to Microsoft, allowing problems to be diagnosed and addressed quickly. The Dexterity runtime engine has implemented Microsoft Application Error Reporting, allowing the Microsoft Dynamics GP development team to provide this diagnostic capability.

Reporting and Analytics

Extracting and presenting information in a meaningful way is vital for an application like Microsoft Dynamics GP. Several reporting and analytics solutions are available. Some are delivered as part of the core Microsoft Dynamics GP application, while others are additional products that extend the application.
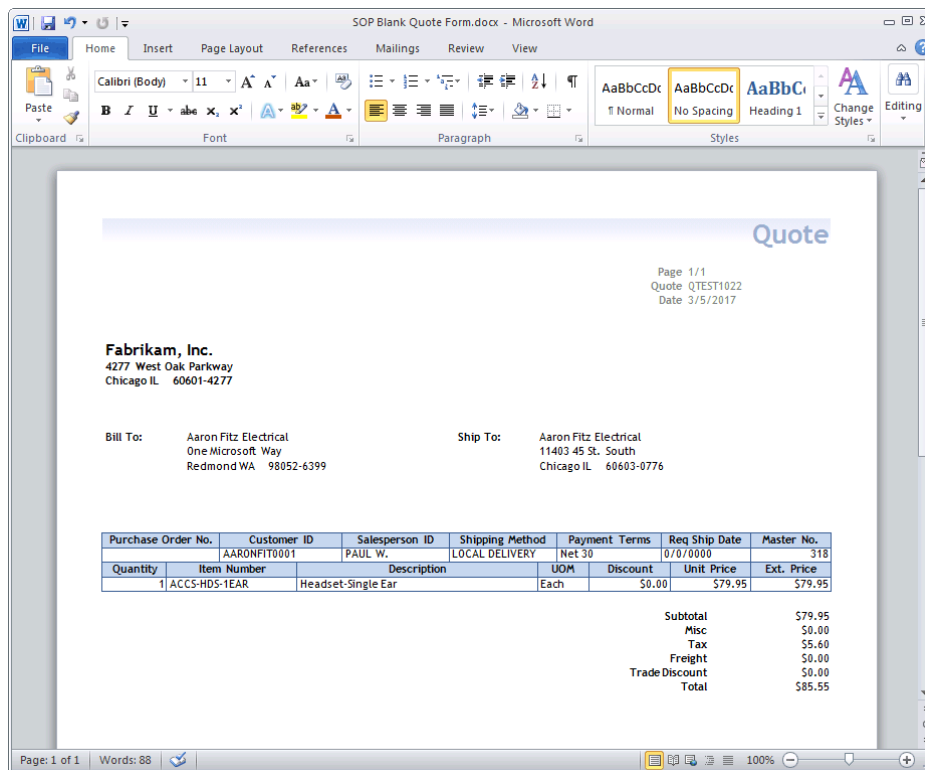
Report Writer

The Report Writer is the reporting tool that is part of the Dexterity runtime engine. The core reporting capabilities of Microsoft Dynamics GP are provided by the Report Writer, which is available with every Microsoft Dynamics GP installation.

By being part of the runtime engine, the Report Writer has enhanced access to tables in the accounting system. The Report Writer automatically creates and executes special SQL queries that allow reports to be generated more quickly. Also, code in the Microsoft Dynamics GP application can pre-assemble data for optimal use on reports. Special features, such as formatting for currency values, are built in.

The Report Writer and reports created with it are integrated into the Microsoft Dynamics GP security model. The Microsoft Dynamics GP administrator can control which users can access to the Report Writer and the underlying data used for reports.

The Report Writer creates two types of reports. Graphics reports can use a variety of fonts, shapes, and pictures. They are used for reports that should be visually appealing, such as invoices. Text reports contain only text, and are designed to print quickly. They do this by using the built-in rendering capabilities of the current printer. Text reports are used for reports that can be lengthy, such as a trial balance.
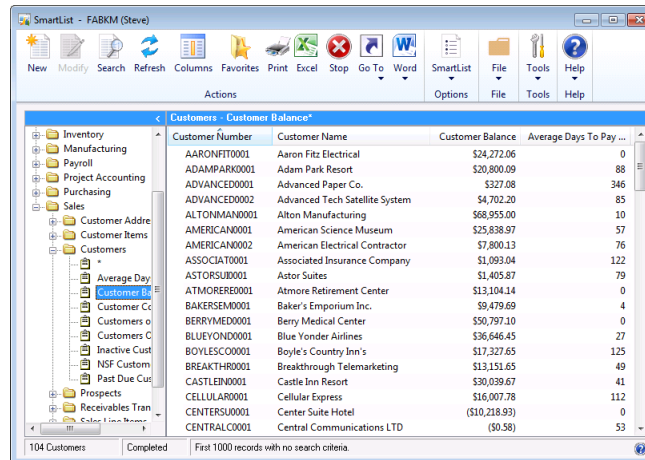
Reports in Microsoft Dynamics GP can also be rendered in Microsoft Word format. These template-enabled reports are standard Report Writer reports that have Microsoft Word report template documents associated with them. When these template-enabled reports are printed, the template is retrieved and used to render the output in Microsoft Word format.

In addition to creating new reports, the Report Writer can be used by end-users to customize reports. The graphical layout window used to design reports is also used to customize their appearance. If a Microsoft Word template is used for a report, Microsoft Word can be used to customize the report template.

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SmartList

The SmartList feature in Microsoft Dynamics GP is another data access tool that can organize and present data from the accounting system. The SmartList displays lists of records from a specific category, such as Customers or Purchase Orders. Search criteria can be applied, limiting the results to only the records of interest. The columns displayed, as well as the column order can be specified.

Once set up, a SmartList search can be added as a favorite so it can easily be rerun. The search results can be exported to Excel or Word. These features make SmartList an excellent tool for creating ad-hoc reports.

Other Reporting Solutions

In some cases, the reporting solutions included with Microsoft Dynamics GP may not fill all of your reporting requirements. The Microsoft Dynamics GP architecture provides easy access to data to allow other reporting tools to be used.

Management Reporter for Microsoft Dynamics ERP

Management Reporter for Microsoft Dynamics ERP provides real-time financial reporting. It enables generation of professional-looking financial statements, such as profit and loss statements, balance sheets, and cash flow reports. Management Reporter makes it easy to manage and distribute critical financial reports your business depends on to run effectively.

Excel Reports

From within Microsoft Dynamics GP, the system administrator can deploy Excel Reports that provide access to data from various areas of the accounting system. The Excel Reports use a data connection that allows them to be updated with real-time data from the back office application databases. When placed in a common network location or a Windows SharePoint Library, people throughout the organization can access these Excel Reports without the need for a Microsoft Dynamics GP client.

SQL Reporting Services

Since all data for Microsoft Dynamics GP is stored and managed by SQL Server, another reporting option is to use SQL Server Reporting Services (SSRS). Based on .NET and XML Web services, SQL Server Reporting Services is a robust environment for defining, managing, and distributing reports throughout an entire organization. Several predefined SSRS reports are included with Microsoft Dynamics GP.

Business Analyzer

Business Analyzer is a separate application that you can use to select and view SQL Server Reporting Services reports for Microsoft Dynamics GP. This expands the availability of this vital business information to users outside of the accounting system.
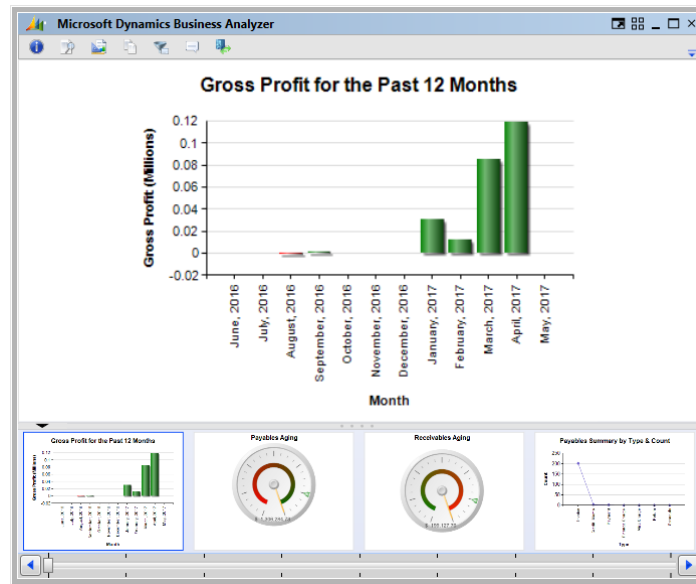
Workflow

Workflow, which controls the flow of documents through the accounting system, is a common business need. Microsoft Dynamics GP has a workflow engine powered by SQL Server that is used to implement approval workflows for several common document types. For example, a purchase approval workflow can be set up to control who must approve purchase orders over a specified amount. Workflow functionality can be accessed from both the desktop client and the web client. For example, the following illustration shows a workflow approval action being performed for a purchase order document in the desktop client.

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There are several additional ways users can be notified of and perform workflow tasks.

- Users can receive workflow notifications directly on the Home page Microsoft Dynamics GP. They can use the notification to view the document and perform actions such as approving or rejecting the request.
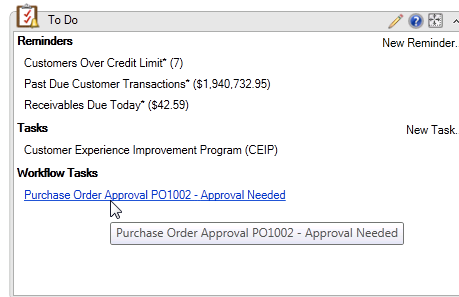
- Users can receive email messages indicating that workflow tasks need to be performed.
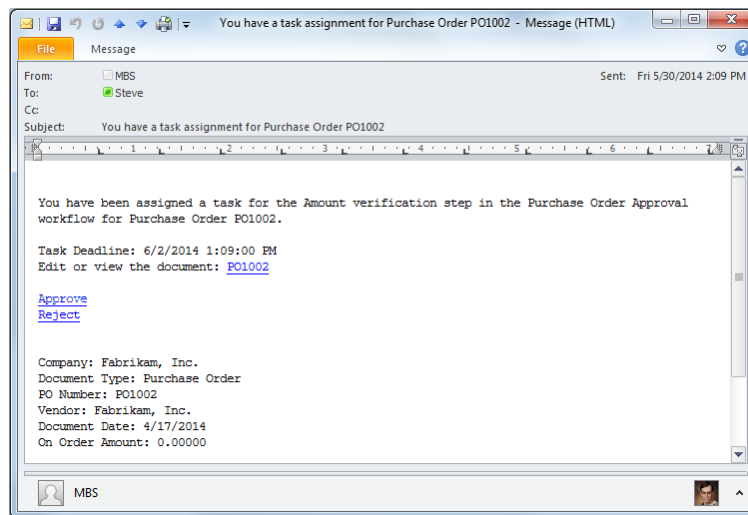
- From a link within email, users can access a web service through their web browser to view workflow information and perform actions for the documents assigned to them.

Business Portal

Microsoft Dynamics GP manages data that is valuable beyond the accounting department. Business Portal is a web-based business application that you can use as your company intranet or as an extension to your company intranet. It provides secure access to this vital back office data to users throughout the organization.

Architecture

Business Portal is uses SharePoint as its foundation. Two versions of Business Portal are available.

- Business Portal 6.0 can be installed with SharePoint Foundation 2010 or SharePoint Server 2010.

- Business Portal 6.1 can be installed with SharePoint Foundation 2013 or SharePoint Server 2013.

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The version you implement will depend on which version of SharePoint you are using. The following illustration shows Business Portal running with SharePoint 2010.
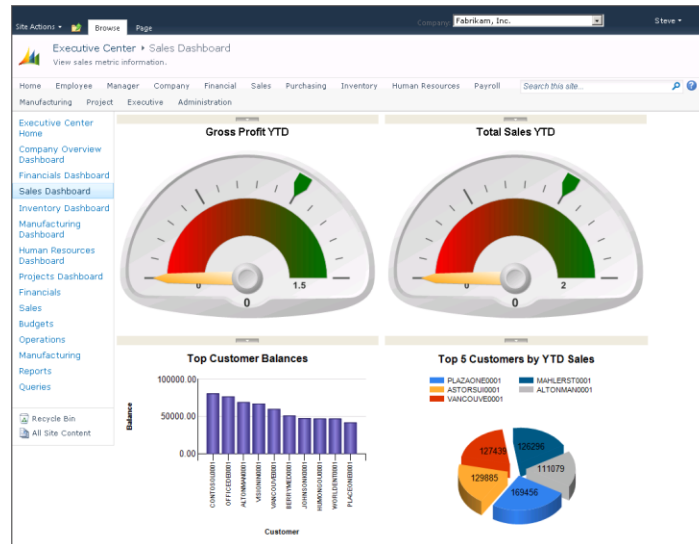
Capabilities

Business Portal uses a web-based interface to provide access to back office data in Microsoft Dynamics GP. Several types of pages are used in Business Portal:

Page Type	Description
Center Site Home Pages	Provides a starting point to access a particular category of data, such as Financial, Sales, or Purchasing.
Information Pages	Presents data about particular items in the system, such as customers, accounts, or inventory items.
Query Pages	Allows users to create and run queries that retrieve data about specific items in the system. Several predefined queries are delivered with Business Portal. Users can modify these queries or create their own.
List Pages	Uses the SharePoint Lists to present data from the back office.
Dashboard Pages	Brings together related information to help people perform their jobs. For instance, the Sales Dashboard is designed for people working in sales. Information is typically presented as charts or graphs.

Additional applications available for the Business Portal extend its capabilities further. For example, employees can use the Human Resources application for Business Portal to perform tasks like updating personal contact information, submitting timecards, and viewing paychecks. Requisition Management, another application available for Business Portal, can manage purchase requests.

Security is integrated throughout Business Portal. Once users have logged into a domain, their domain credentials are used to authenticate them for Business Portal. Access to resources in Business Portal is role-based. Several roles are defined in Business Portal, such as Accounting Specialist or Salesperson. Users can see only data relevant to the roles to which they have been assigned.

64-bit Support

As computer hardware continues to improve, 64-bit computing has become the new standard. The server has been the first area that has taken advantage of the increased power that 64-bit computing provides. Server operating systems like Windows Server 2008, as well as server applications like SQL Server and SharePoint have been available as 64-bit versions for several years. The following server components of the Microsoft Dynamics GP system can be run natively on 64-bit operating systems:

- eConnect
- Web Services
- Workflow
- Business Portal

Most client applications available today are still 32-bit applications. The 64-bit editions of client operating systems like Windows 7 and Windows 8 do an excellent job running these 32-bit applications. The Microsoft Dynamics GP desktop client is a 32-bit application that is fully supported in 64-bit operating systems.

Application Manageability

To improve the manageability of the client and the server, Microsoft Dynamics GP uses built-in features and features of the Windows Server platform.

Client

Larger Microsoft Dynamics GP installations may have several dozen users. Managing an application on that many individual desktops can consume valuable IT resources. Two solutions are commonly implemented to make managing the desktops easier:

- The Microsoft Dynamics GP Web Client can be deployed, which allows users to access Microsoft Dynamics GP through the Internet Explorer web browser on their system.
- Using capabilities in Remote Desktop Services (formerly known as Terminal Services), Microsoft Dynamics GP can be deployed to these desktops as a remote application. This allows Microsoft Dynamics GP to be managed in one location on the application server, while still providing users with the familiar experience of running Microsoft Dynamics GP on a local workstation.

If you choose to install the Microsoft Dynamics GP client application on individual workstations, you can use the Microsoft Dynamics GP installer to create an installation package. The installation package can be deployed manually, or through a software distribution tool like System Center Configuration Manager.

To make installing updates easier on multiple clients, you can use the Automated Client Updates feature in Microsoft Dynamics GP. When a user logs in to Microsoft Dynamics GP and a client update is required, a message will inform the user and explain the actions needed to install the update.

Server

Microsoft Dynamics GP installations can require multiple servers to host required server applications such as SQL Server, SharePoint, and Business Portal. Server virtualization technologies like Hyper-V for Windows Server can help reduce the number of physical servers needed to host these server applications. All Microsoft Dynamics GP server applications can be implemented in a Hyper-V environment. Additional benefits of the Hyper-V environment include the following:

- Improved server resource utilization.
- Easier backup and restore operations.
- Snapshot capability, which provides flexibility when performing server maintenance.

Application Extensibility

Microsoft Dynamics GP provides excellent core accounting features. However, many businesses require additional capabilities that are specific to their industry or market. Recognizing this important fact, Microsoft Dynamics GP has been designed from the beginning to be extensible. Hundreds of ISVs (Independent Software Vendors) have created add-ons and enhancements for Microsoft Dynamics GP to target specific industries, markets, and customer types.

Multidictionary Architecture

A primary feature of the Microsoft Dynamics GP platform that allows extensibility is the multidictionary architecture provided by the Dexterity runtime engine. The multidictionary architecture allows multiple applications created with Dexterity to be run at the same time. For example, the following illustration shows the core Dynamics dictionary, and two additional integrating application dictionaries that all function together in the multidictionary environment.

Microsoft
Dynamics GP
application

Runtime
Engine

Dynamics
Dictionary

Human
Resources
Dictionary

Manufacturing
Dictionary
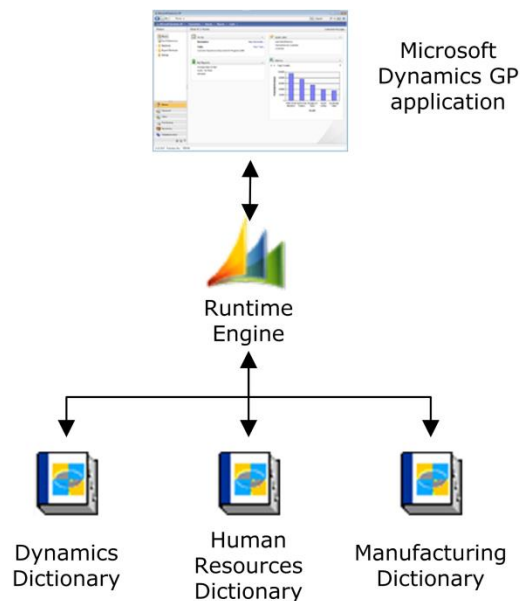
The following are the key benefits of the multidictionary architecture:

- Multiple applications can function together, appearing as a single application to the user.

- Integrating dictionaries can use resources from the Microsoft Dynamics GP core dictionary.

- Integrating dictionaries can provide alternate versions of forms and reports in Microsoft Dynamics GP.

- Like the main application dictionary, integrating dictionaries can be customized using tools like the Modifier, Report Writer, and VBA.

Trigger System

The Dexterity runtime engine provides an extensive trigger system that allows integrating application to be notified when events occur in another dictionary. An application registers the events for which it should be notified, such as a window being opened. When the event occurs, code in the application is run in response to the event. Integrating applications created with Dexterity, the Modifier with VBA, the .NET API (Visual Studio Tools), and the COM API (Continuum) all use this sophisticated trigger system.

ARCHITECTURE

Development Options

Add-on applications for Microsoft Dynamics GP can be created using several different tools. The following table lists the tools commonly used:

Tool	Description
Dexterity	The development environment used to create the Microsoft Dynamics GP application. The most tightly integrated add-ons are created with Dexterity.
Modifier with VBA	Customized forms are created with the Modifier, and additional forms and business logic are added with VBA.
Visual Studio Tools (.NET API)	An add-on for Microsoft Visual Studio that allows creating .NET-based integrations for Microsoft Dynamics GP. Integrations can be written in Visual Basic .NET or C#.
Continuum (COM API)	Any application development tool that can access a COM API, such as Visual Basic, can be used to create these types of integrations. Typically, these are smaller interface-level modifications or database integrations.
eConnect	Any development tool that can use one of the eConnect programming interfaces can be used. eConnect is the preferred method for database-level integrations.
Web Services	Most development tools that can access a standard web service interface can be used. Web Services provides an ideal way to access Microsoft Dynamics GP data over an intranet.

The tool chosen to create an integration depends on several factors. The primary factor is the type of integration being created. For add-ons that integrate tightly with the Microsoft Dynamics GP interface, Dexterity, Visual Studio Tools, and the Modifier with VBA are the preferred tools. Add-ons that integrate at the database level, and primarily import and export data would typically be created with eConnect or Web Services.

The developer's skill set is another factor. The various development tools that can be used to create integrations allow developers to leverage existing skills. For example, if a developer is already a capable Visual Basic programmer, the Modifier with VBA would be the preferred tool for developing an interface-level integration. Skilled .NET developers would likely choose Visual Studio Tools for Microsoft Dynamics GP.

Conclusion

Microsoft Dynamics GP has a client foundation provided by the Dexterity runtime engines, and the server foundation provided by Windows Server, Microsoft SQL Server, and SharePoint. With these solid foundations, Microsoft Dynamics GP offers the following:

- Flexible deployment options, with both a desktop client and a web client
- Excellent performance on both the client and the server
- Great customization capabilities
- Flexible data integration to allow access to data
- Unique platform features ideal for business applications
- Ample reporting capabilities
- Integration with standard Microsoft applications, like Microsoft Office
- Support for Unified Communications

- Workflow capabilities

- Access to valuable data by the entire organization through Business Analyzer, Microsoft Excel, and Business Portal

- Support for Windows Server technologies that make Microsoft Dynamics GP deployments easier to manage

- Support for 64-bit computing

- An extendable architecture allowing add-ons and vertical enhancements

The product architecture is a key element that makes Microsoft Dynamics GP an outstanding solution for an organization today and into the future.

Microsoft