Microsoft

Microsoft® Visio® 2000 IT Products Evaluation Guide

For Professional Edition and Enterprise Edition

Contents

Introduction

Microsoft® Visio® 2000 Professional Edition and Microsoft Visio 2000 Enterprise Edition information technology (IT) products provide an unprecedented suite of tools for streamlining the planning, implementation, and management of your IT systems—networks, databases, and software applications.

Professional Edition and Enterprise Edition deliver industry-standard tools for quickly and efficiently diagramming networks, databases, and software applications. Enterprise Edition offers all the features in Professional Edition, plus automated tools for IT design and documentation.

In this chapter

Getting started

This guide covers the fundamentals of Microsoft Visio 2000 Professional Edition and Enterprise Edition, and focuses on the drawing types and methods you're likely to use most often.

Installing Microsoft Visio 2000 Professional Edition or Enterprise Edition

You must be running Microsoft Windows® 95, Microsoft Windows 98, or Microsoft Windows NT® 4.0 or later to install your Visio 2000 product from the Microsoft Visio 2000 CD.

NOTE *To prepare for installation, close all programs and turn off virus protection software to prevent installation conflicts.*

On most Windows-based systems, installation starts automatically when you insert the Microsoft Visio 2000 CD into your CD-ROM drive. If installation does not start automatically, you can install your Visio 2000 product using the following procedure.

To install Microsoft Visio 2000

1. Insert the Microsoft Visio 2000 CD into your CD-ROM drive.
2. From the Start menu, choose Run.
3. In the Run dialog box, type *d:\setup*, where *d* is the letter assigned to your CD-ROM drive.
4. Click OK.

The Microsoft Visio Installation Manager guides you through the installation process.

Visio on the Web

To reach the Visio Division of Microsoft Corporation Web site and the Visio Knowledge Base using the World Wide Web, in Visio 2000 choose Help > Visio On The Web.

The Visio Division Web site contains information on service releases, support forums, and training opportunities. The Visio Knowledge Base offers the latest tips on using Visio 2000 products and articles that answer frequently asked questions (FAQs).

To contact customer service or technical support, choose Help > Visio On The Web, and then follow the links to locate support information for your geographic area.

Introducing Professional Edition and Enterprise Edition

With Microsoft Visio 2000 IT solutions, you'll be equipped to tackle your most challenging IT projects: planning e-commerce infrastructures; migrating to Microsoft Windows 2000; preparing for the convergence of voice/data networks; implementing enterprise application integration; and more. Visio 2000 IT solutions deliver unprecedented power for visualizing the key IT domains—networks, databases, and software applications.

E-commerce planning and implementation

When a corporation adopts an e-commerce strategy, the IT group bears the brunt of the change, translating business requirements into a supporting technology infrastructure. Web-based applications display products for sale on secure, private sites; applications run underneath to control transactions; databases store customer and financial information; firewalls provide security; and the site has to stay live 24 hours a day. Employees, consultants, and service providers have to come up to speed on new systems fast. Visio 2000 IT solutions can help to

- Draw process and dataflow diagrams to see how customers will navigate your site, ensuring that the exchange is quick, easy, secure, and profitable.
- Diagram the Web site, database, software, and network architectures that support the site.
- Use these diagrams as a central respository for viewing and updating the e-commerce site architecture.
- Give your e-commerce managers a view into what's happening at critical points in the network infrastructure so they can prevent hardware overload and system crashes.

Microsoft Windows 2000 and Active Directory deployment

Visio 2000 IT solutions provide the tools to visualize the planning, implementation, and continuing maintenance of Windows 2000 and the Active Directory™ directory service.

- Adapt the diagram of the existing architecture to the planned Windows 2000 and Active Directory configuration.
- **Enterprise Edition only** Use AutoDiscovery technology to diagram all layer 2 (data link), layer 3 (network layer) and frame relay devices in your current network.
- **Enterprise Edition only** Create the directory services database in your Visio product, then export information from the diagram to Active Directory through the LDIF (Lightweight Directory Interchange Format) file format.

You can run Microsoft Visio 2000 from a Windows Terminal Server so your organization can go to a thin client model, with no need to install the Visio application on any desktops. For details, see the Network.wri file in your Visio folder.

Voice and data network convergence

As companies move to adapt new widescale communications technologies, such as voice over IP (VoIP), wireless, and computer telephony integration (CTI), IT groups once again face planning, managing, and sustaining significant changes to their existing infrastructures. Use the Visio 2000 IT solutions to do the following:

- Design high-level changes required for switching to the VoIP network.
- **Enterprise Edition only** Automatically document your existing IP networks with the AutoDiscovery technology.
- **Enterprise Edition only** Create detailed to-be plans with more than 18,000 manufacturer-specific Visio Network Equipment Shapes.

Customer Relationship Management implementation

Customer Relationship Management (CRM) ensures that all employees who deal with customers interact with and view the same information about customers. Use Visio 2000 IT solutions to support this sort of complex implementation as follows:

- Capture your current customer acquisition and retention process with process flow diagrams that can give your CRM vendor and systems integrators a picture of what you need from a CRM system.
- Include before and after drawings when you sign your CRM purchase agreement and implementation arrangement letter to confirm and verify your and your vendor's assumptions and expectations.
- Capture business rules using natural language, then jump-start the database coding effort by using the resulting diagrams to generate database schemas.
- Keep implementation participants in sync by publishing a series of drawings that document the overall hardware, software, and database architecture.
- Train new users on the CRM system using Visio 2000 process flow diagrams; document revisions to the system in Visio 2000.

Enterprise application integration

Under pressure to support e-business while keeping up with object-oriented programming, many IS groups are moving toward integrating multiple applications enterprisewide, rather than relying on decentralized, department-level approaches. Use Visio 2000 IT solutions to support this high level of integration by

- Documenting the entire IT infrastructure prior to planning for the new architecture, capturing the people, business processes, software, and hardware that drive the current applications infrastructure.
- Reverse engineering existing applications structures to see how existing databases and software applications can best be consolidated.
- Forward engineering database schemas from entity relationship (ER) diagrams to jump-start database development.
- Documenting existing and planned network devices, including directory services that support current and planned software applications.

Comparing Professional Edition and Enterprise Edition

Both Professional Edition and Enterprise Edition are aimed at IS/IT specialists. If you create high-level overview diagrams and communicate key information about your information systems to others, choose Professional Edition. If you design and document information on an enterprise level, choose Enterprise Edition with its powerful automated tools. (Enterprise Edition includes all of the Professional Edition functionality.) The following table provides a complete list of the Visio 2000 IT solutions and shows which come with Professional Edition, Enterprise Edition, or both.

Networking solutions

Solution description	Professional Edition	Enterprise Edition
Active Directory Design accurate and efficient directory structures that are compliant with Microsoft Active Directory schemas and Microsoft Windows 2000.	Yes	Yes
Import existing tree views and export the diagram to a file that you can use to update your network.	No	Yes
AutoDiscovery and Layout Automatically locate all of the devices on your enterprise network, and then create network diagrams that are easy to maintain.	No	Yes
Conceptual Web Site Create a high-level diagram of content on and navigation through a new Web site, or reorganize an existing Web site.	Yes	Yes
LDAP Directory Create a general-purpose directory service network diagram.	Yes	Yes
Import existing tree views and export the diagram to a file that you can use to update your network.	No	Yes
Logical Network Diagram Create logical diagrams that describe the structure and scope of networks.	Yes	Yes
Network Diagrams Plan and document simple networks, and track equipment by associating serial number and location data with shapes.	Yes	Yes
Network Reports Automatically create robust network documentation with network reports on discovered data.	No	Yes

Networking solutions *(continued)*

Solution description	Professional Edition	Enterprise Edition
Novell Directory Services Design existing Novell Directory Services® (NDS®) trees automatically.	Yes	Yes
Import existing tree views, modify the structure, and then export the diagram to a file that you can use to update your network.	No	Yes
Visio Network Equipment Shapes Access more than 18,000 manufacturer-specific network equipment shapes to create network diagrams—such as a wiring closet, LAN, or WAN.	Sampler only	Yes
Web Site Map Generate a site map of an existing Web site to analyze the details of the site—such as the organization and navigation patterns—and classify the content.	Yes	Yes

Database modeling solutions

Solution description	Professional Edition	Enterprise Edition
Bachman Create entity relationship diagrams for data modeling in relational databases and information systems design using Bachman notation.	Yes	Yes
Chen ERD Create entity relationship diagrams using Chen ERD notation.	Yes	Yes
Database Model Diagram Create relational and object-relational database models.	Yes	Yes
ER Source Model Create relational and object-relational database models in a team or collaborative environment.	No	Yes
Express-G Create entity-level and schema-level diagrams using Express-G notation, the graphical component of the Express formal information requirements specification language.	Yes	Yes
Martin ERD Create object-oriented analysis and design diagrams using Martin ERD notation.	Yes	Yes
ORM Diagram Create a conceptual data model using Object Role Modeling notation.	Yes	No
ORM Source Model Create conceptual models that are based on facts and business rules, build logical models, and then map them to a physical database.	No	Yes

Software modeling solutions

Solution description	Professional Edition	Enterprise Edition
Booch OOD Create object, class, timing, state, module, and process diagrams using Booch object-oriented design notation.	Yes	Yes
COM and OLE Create COM (Component Object Model) objects, interfaces, and system diagrams.	Yes	Yes
Data Flow Model Diagram Create data flow diagram models using Gane-Sarson notation. Includes a model navigator, semantic error checking, and automatic level balancing.	Yes	Yes
Fusion Create the diagram types included in Fusion methodology.	Yes	Yes
Jackson Create data and program structures using the Jackson software design method.	Yes	Yes
Jacobson Use Case Create use case, state transition, interaction, and other diagrams included in the Jacobson object-oriented software engineering method.	Yes	Yes
Nassi-Schneiderman Represent sequence, selection, case, and repetition in program structure charts.	Yes	Yes
Program Structure Create structural diagrams of programs and memory objects.	Yes	Yes
ROOM Create Real-Time Object-Oriented Modeling (ROOM) diagrams.	Yes	Yes

Software modeling solutions *(continued)*

Solution description	Professional Edition	Enterprise Edition
Rumbaugh OMT Create object, dynamic, and functional diagrams using the Rumbaugh Object Modeling Technique.	Yes	Yes
Shlaer-Mellor Create class diagrams, class structure charts, dependency diagrams, and inheritance diagrams using Shlaer-Mellor notation.	Yes	Yes
SSADM Create logical data structures, data flow diagrams, entity life histories, and other system analysis and design diagrams.	Yes	Yes
System Structure Create diagrams that represent Windows and Macintosh operating systems and user interfaces.	Yes	Yes
UML Create integrated UML system models. Reverse engineer Microsoft Visual C++®, Visual Basic®, and Visual J++® code; share models through Microsoft Repository; generate code skeletons for C++, Java, and Visual Basic; and create reports of UML models. Uses the entire UML 1.2 notation and includes semantic error checking.	Modeling and reverse engineering only	Yes
Windows User Interface Develop, document, and prototype your user interface using elements from the Microsoft Office and Windows.	Yes	Yes
Yourdon and Coad Create object state, data flow, and other diagrams included in the Yourdon and Coad object-oriented analysis and design notation.	Yes	Yes

Additional Visio solutions

Solution description	Professional Edition	Enterprise Edition
Audit Flowcharts Document and analyze processes that involve financial transactions or inventory management.	Yes	Yes
Basic Diagrams Create drawings for brainstorming, planning, and communication.	Yes	Yes
Block Diagrams Create drawings for brainstorming, planning, and communication. Create tree diagrams that represent hierarchies and onion diagrams.	Yes	Yes
Block Diagrams with Perspective Create drawings using geometric shapes that have a 3-D appearance.	Yes	Yes
Calendars Create a calendar for a month or the year on a single page.	Yes	Yes
Cause-and-Effect Diagrams Document all factors that contribute to or affect a given situation. Also called Ishikawa, fishbone, or characteristic diagrams.	Yes	Yes
Charts and Graphs Create charts and graphs for presentations and reports.	Yes	Yes
Cross-Functional Flowcharts Show the relationship between a business process and the organizational or functional units—such as departments—responsible for that process.	Yes	Yes
Data Flow Diagrams Document the logical flow of data through a set of processes or procedures.	Yes	Yes
Directional Maps Create easy-to-read maps that use clearly identifiable roadways, metro routes, and landmarks.	Yes	Yes
Flowcharts Describe or analyze processes, document procedures, indicate work or information flow, and track cost and efficiency.	Yes	Yes
Form Design Create business forms, such as invoices, product orders, customer information profiles, and inventory records.	Yes	Yes
Gantt Charts Schedule, plan, and manage projects.	Yes	Yes

Additional Visio solutions *(continued)*

Solution description	Professional Edition	Enterprise Edition
Geographic Maps Create detailed maps of countries, continents, and regions with their geographic entities—including lakes and rivers—in correct relationship to one another.	Yes	Yes
IDEF0 Diagrams Model business and organizational processes.	Yes	Yes
Marketing Diagrams Create drawings for process modeling, benchmarking, simulation and improvement, path routing, time and cost analysis, activity-based costing, product portfolios, scope and marketing mix, product life and adoption cycles, market and resource analysis, and pricing matrices.	Yes	Yes
Mind Maps Use to brainstorm and take notes.	Yes	Yes
Office Layout Drawings Draw floor plans for individual rooms or for entire floors of your building—including the wall structure, building core, and electrical symbols.	Yes	Yes
Organization Charts Graphically represent the interrelationships among people, operations, functions, and activities in an organization.	Yes	Yes
PERT Charts Plan and monitor projects, organize tasks, establish timeframes, and show tasks that are dependent on other tasks.	Yes	Yes
SDL Flowcharts Create object-oriented flowcharts that document communications and telecommunications systems networks using a format designed to International Telecommunications Union standards.	Yes	Yes
Timelines Create linear timelines that illustrate milestones and events over the life of a project or process.	Yes	Yes
TQM Flowcharts Document processes graphically, compare current and ideal processes, and understand how steps in the process work together.	Yes	Yes
Work Flow Flowcharts Describe, analyze, and document processes in an organization.	Yes	Yes

What's new in the Microsoft Visio 2000 IT products

Microsoft Visio 2000 Professional Edition and Enterprise Edition include powerful additions to the Visio graphics engine and feature enhancements to the IT-specific solutions.

You can work efficiently using the following enhanced features in the graphics engine that all Visio 2000 products share.

- Easily create custom data for shapes that you can later use for reports.
- Set tabs, margins, and hanging indents using a text editing ruler.
- Nudge selected shapes using the arrow keys for precise placement in your diagram.
- Easily navigate, rearrange, and rename pages using page tabs.
- Edit groups the same way you edit regular shapes.
- Edit stencils directly in the drawing window.
- Customize menus and toolbars.
- Perform tasks right in the drawing window using anchored windows.

The following tables list additions and enhancements to the Visio IT-specific solutions.

Network diagrams

Feature or functionality	Professional Edition	Enterprise Edition
Create LAN, WAN, wiring closet, server room, and telecommunications diagrams.	Yes	Yes
Document and diagram Microsoft Active Directory, NDS, and LDAP (Lightweight Directory Access Protocol) compliant directory services.	Yes	Yes
Use the network-specific Custom Properties fields to create, store, and report on data associated with the shapes in your diagram.	Yes	Yes
Discover and document layer 2, layer 3, and frame relay network environments. The Discovery Wizard lets you determine how much or how little of your network is discovered.	No	Yes
Automatically create hyperlinked network diagrams using the AutoLayout feature.	No	Yes
Document existing directory trees using import and export tools.	No	Yes

Database diagrams

Feature or functionality	Professional Edition	Enterprise Edition
Create a detailed picture of leading database management systems (DBMSs).	Yes	Yes
Reverse engineer databases using drivers for leading DBMS vendors, such as Microsoft, IBM, Informix, Oracle, and more.	Yes	Yes
Reverse engineer tables, views, relationships, primary or foreign keys, and code, such as triggers, stored procedures, and check clauses.	Yes	Yes
Merge multiple diagrams into a single database model using projects.	No	Yes
Automatically generate database schemas after capturing business rules using Object Role Modeling.	No	Yes
Forward engineer databases from conceptual to logical to physical schemas.	No	Yes

UML diagrams

Feature or functionality	Professional Edition	Enterprise Edition
Document the entire software development process using any UML 1.2 diagram type.	Yes	Yes
Reverse engineer code into UML models from Microsoft Visual Basic, Microsoft Visual C++, and Microsoft Visual J++.	Yes	Yes
Generate code skeletons from UML models into Visual Basic, C++, and Java.	No	Yes
Create reports from UML static structure, activity, and deployment diagrams.	No	Yes

Internet diagrams

Feature or functionality	Professional Edition	Enterprise Edition
Create high-level, conceptual diagrams of new Web sites to stimulate discussion of the sites' purpose, content, and overall structure.	Yes	Yes
Generate maps of existing Web sites to analyze their organization.	Yes	Yes
Troubleshoot errors and missing hyperlinks.	Yes	Yes

Data flow diagrams

Feature or functionality	Professional Edition	Enterprise Edition
Basic diagram-only data flow diagramming.	Yes	Yes
Model-based data flow diagramming, including a model navigator, optional error checking, and automatic level-balancing.	Yes	Yes

CHAPTER 1

Visio basics

Microsoft Visio 2000 seamlessly integrates with Microsoft Office. With its Office-compatible interface elements, such as functionally grouped toolbars and tabbed dialog boxes, the Visio 2000 diagramming environment is friendly, intuitive, and familiar.

While each Microsoft® Visio® 2000 Professional Edition and Enterprise Edition template contains a unique set of shapes, tools, and styles, some tasks are common to creating all types of Visio drawings or diagrams.

This chapter explains how to get your drawing or diagram on the page in minutes, how to format your content quickly, and how to get it to your audience, regardless of the type of drawing or diagram you're creating.

You'll also learn about using the powerful Visio graphics engine—a program platform that enables the flexible, uniform behavior of the shapes, stencils and templates you use to create your diagrams—to draw your own shapes and add behavior to them to make them "smart."

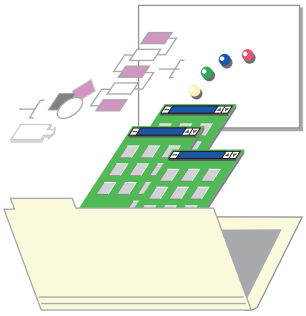
This chapter may be all you need to get started working with Microsoft Visio 2000.

In this chapter

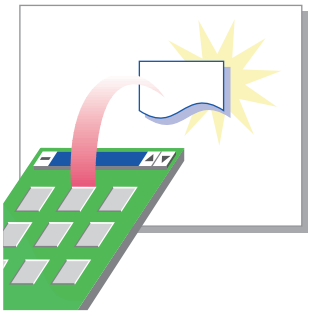
The Visio workspace

The Microsoft Visio 2000 products share a core set of features. This means that you can use the same basic methods to work with all of the Visio 2000 programs to create your diagrams. The illustration below shows five steps that are common to making any Visio 2000 diagram. The following pages define the common elements of the Visio interface, explain how the elements are organized, and show the actual workspace you'll use to create Visio diagrams.

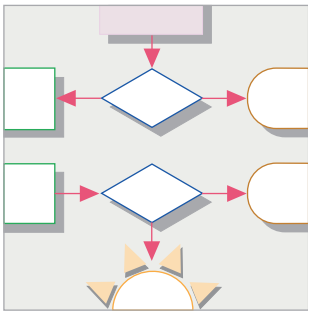
Five steps to making a Visio diagram



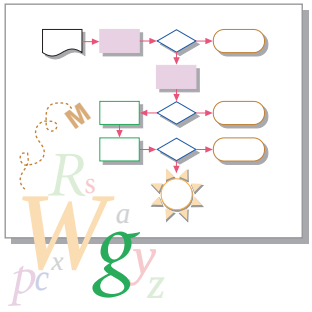
1 Start a diagram by opening a drawing type, or template.



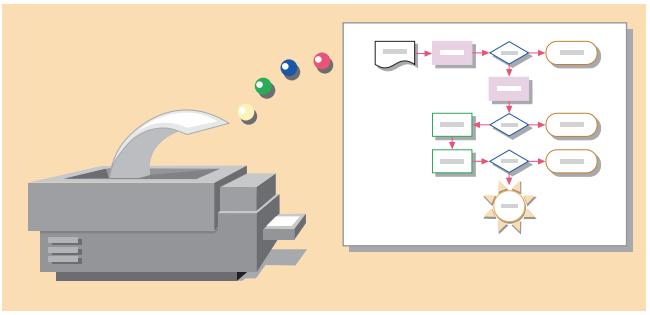
2 Add shapes by dragging them from the stencil and dropping them onto the drawing page.



3 Connect the shapes in your diagram.

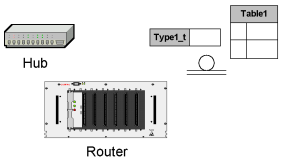
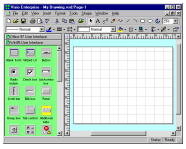
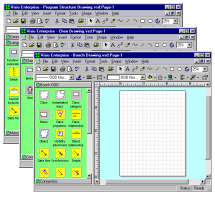


4 Add text to shapes in your diagram, and add independent text for titles.



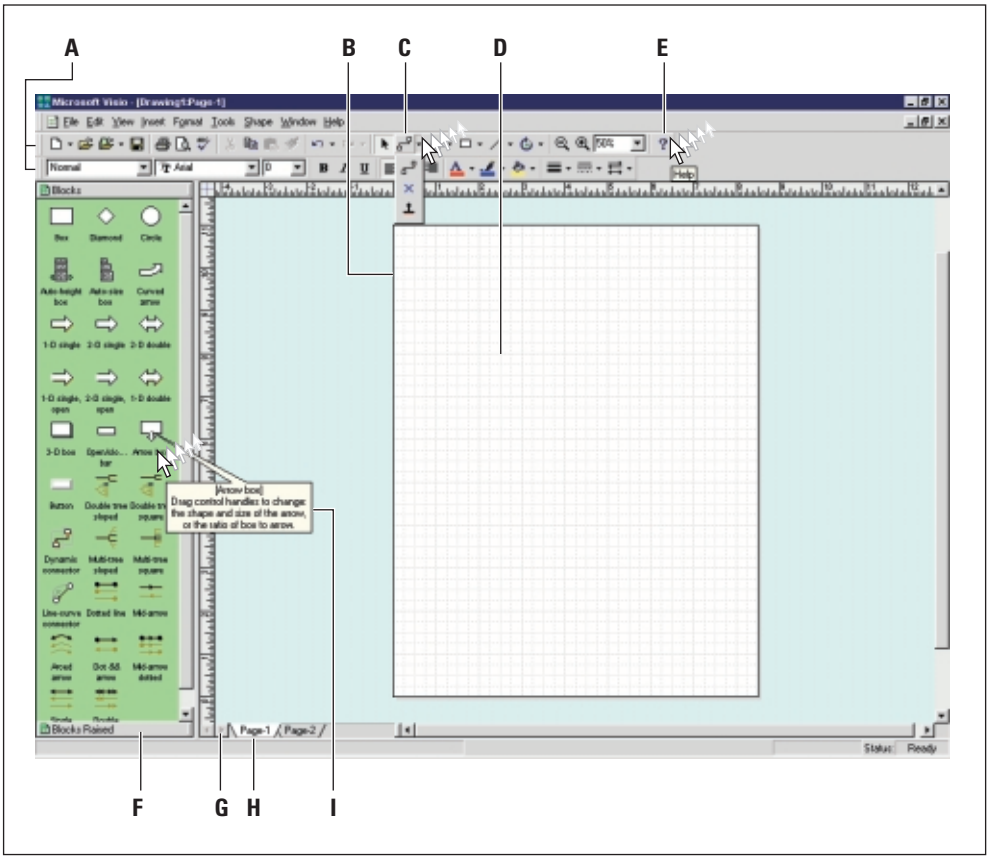
5 Publish your diagram to the Web, or print your diagram to share it with others.

Visio fundamentals

Visio concept	Definition	How it works in the Visio program
SmartShapes® symbol 	A predefined shape that is stored on a Visio stencil. SmartShapes symbols are not static clip art images or symbol libraries. Rather they are objects programmed to behave appropriately within a particular context.	To include a SmartShapes symbol in a diagram, drag it from the stencil and drop it onto the drawing page.
Stencil 	A storage mechanism where a solution's SmartShapes symbols are collected. You can drag a SmartShapes symbol (or shape) from a stencil onto the drawing page. You can also create custom shapes and save them on stencils.	When you open a Visio 2000 template, you automatically open one or more stencils. You can open additional stencils by choosing File > Stencils > Open Stencil.
Template 	A Visio 2000 file that opens one or more stencils and windows and can contain specific styles and settings (for example, scale and grid) appropriate for a particular kind of diagram. Using a template ensures consistency across your drawing files.	To open a template, choose File > New, choose the solution you want, then choose the template.
Solution 	An application that runs on top of the Visio program, has specialized functionality, and includes one or more templates related to a particular solution area. For example, the UML solution includes one template and a special UML menu with commands for creating models, running semantic error checks, and more.	To work in a solution, you open a template. Choose File > New, choose the solution you want, then choose the template.

The Visio workspace

Each drawing type opens with stencils, shapes, and toolbars appropriate to that drawing type.



A Tools are grouped in functional sets on toolbars. You can specify which toolbars you want to display by choosing View > Toolbars.

B The drawing page opens with size, orientation, scale, grid, and measurements appropriate for the drawing type.

C You can find additional related tools by clicking the arrows next to the button.

D You can use the drawing page grid to align shapes to each other.

E ScreenTips appear when you pause the mouse pointer over a toolbar button.

F Stencils, or collections of masters, dock to the left of the drawing page, by default.

G When your diagram has multiple pages, you can move the horizontal scroll bar to view all of the page tabs.

H With page tabs you can quickly insert new pages, navigate multiple-page diagrams, delete pages, rename pages, and reorder pages.

I Masters are shapes you can add to your diagrams. To quickly view information about a shape, pause the mouse pointer over a shape.

Starting a diagram

When you base a diagram on a Visio drawing type (also called a template) in Visio 2000, you automatically get all the tools and features you need to create that type of diagram.

For example, to create an organization chart, open the Organization Chart drawing type.

To start a drawing

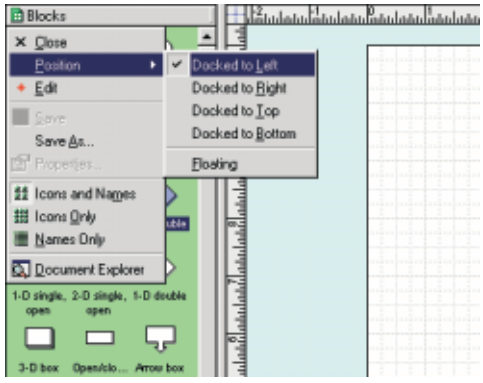
1. Start Microsoft Visio 2000. In the Welcome To Microsoft Visio dialog box, click OK.
2. In the Choose Drawing Type dialog box, click a category name, such as Block Diagram.

   You can see a preview of the drawing types in the Drawing Type box.
3. In the Drawing Type box, double-click the template you want to open, such as Basic Diagram.

   A drawing page appears, with the stencils and tools you need to begin your diagram.

Working with stencils and shapes

When you start a new diagram by opening a template, Visio 2000 opens one or more task-related stencils. Stencils contain shapes you can drag onto the drawing page to create your diagram. You can move stencils in the drawing window to create more workspace by floating, minimizing, or docking them somewhere else.



You can float (make movable) or dock stencils to create more workspace for your diagram.

TIP *To open additional stencils, choose File > Stencils > Open Stencil, choose the stencil you want to open, and then click OK.*

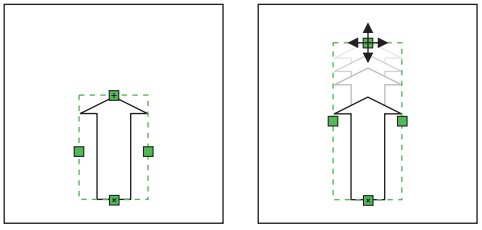
To add a shape to your diagram

1. On a stencil, point to the shape you want to add to your diagram.
2. Hold down the mouse button and drag the shape to the location you want on the drawing page, and then release the mouse button.

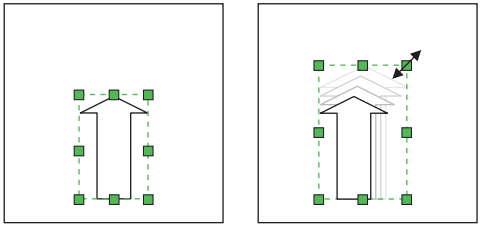
To locate a specific shape quickly, use the Shape Explorer window. Choose Tools > Macros > Shape Explorer.

Using 1-D and 2-D shapes

Visio shapes can be one-dimensional (1-D) or two-dimensional (2-D).



1-D shapes behave like lines and display endpoints you can drag to resize the shapes when you select them with the pointer tool.



2-D shapes have corner handles you can drag to resize the shapes proportionally, and side selection handles you can drag to resize them horizontally or vertically.

Aligning shapes with the dynamic grid

You can use a dynamic grid (dashed lines) to indicate the location for the next shape you drag onto the page, based on the location of shapes already on the page. As you move a shape on the page you can place it precisely using dynamic grid lines to align the shape with other shapes in your diagram.

To turn on the dynamic grid

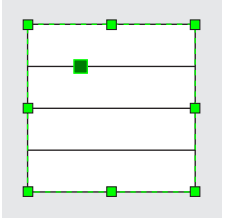
- Choose Tools > Snap & Glue, and then check Dynamic Grid on the General tab.

  When you drop a shape onto the drawing page, Visio 2000 snaps the shape to the nearest grid line so you can position it precisely in your diagram.

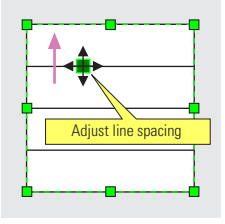
Using shape handles

Visio shapes have handles you can use to resize or move the shape, or to change the shape's appearance, position, or behavior. You use selection handles ( ) to resize shapes, and control handles ( ) to perform actions that are unique to the particular shapes on which they appear.

For example, you might use a control handle to adjust the position of a shape or move a line in a shape.



The control handle looks just like a selection handle, but has darker shading.



To see a ScreenTip for a control handle, pause the pointer over the control handle.

Moving and resizing shapes

Moving Visio shapes is as easy as selecting the shapes and then dragging the selection to the new location in your diagram. You can resize shapes quickly by simply dragging selection handles.

NOTE *When you drag a shape to move or resize it, you can see exactly how the shape changes as you drag. If the shape has text associated with it, the text is repositioned accordingly.*

To move or resize a shape

1. To move the shape, select the shape with the pointer tool ( ), hold down the mouse button while dragging the shape to the location you want in your diagram, and then release the mouse button.

   The pointer turns white when the shape is movable.

2. To resize a selected shape, point to a selection handle ( ) until the pointer changes to a four-headed arrow ( ), and then drag the handle to change the size.

TIP *To limit the movement of shapes to horizontal or vertical, hold down the Shift key while you drag the shapes.*

Quick editing with anchored windows

You can perform quick editing tasks such as changing a shape's size and position, or editing a shape's custom properties, directly in the drawing window using anchored windows.

You can set anchored windows to AutoHide when you're not using them, and conveniently tuck them away until you want to use them again.

Anchored windows in Microsoft Visio 2000

Window	Purpose
Pan & Zoom window	Easily zoom in or out with increased precision
Custom Properties window	View and edit a shape's custom properties
Size & Position window	Change a shape's size, position, or rotation
Drawing Explorer window	View all of the elements in your document

To open an anchored window

- Choose View > Windows, and then click the name of the anchored window you want to open.

To nudge a shape slightly in one direction, select the shape, and then click the up, down, left, or right arrow key.

Connecting shapes

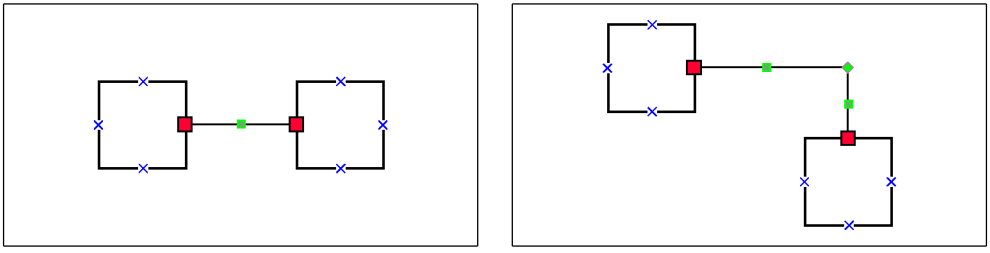
Flowcharts, organization charts, block diagrams, and network diagrams are all connected diagrams—diagrams that show relationships between shapes.

You can use two types of connections in Visio 2000: shape-to-shape and point-to-point. The type of connection you use depends on how much control you want over your diagram.

With shape-to-shape connections, Visio 2000 maintains the most direct connection between the actual connection points. This means that the actual points of connection might change when you move the connected shapes in relation to each other.

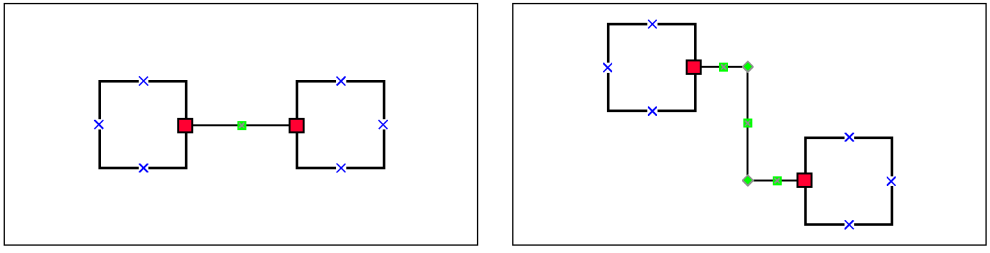
With point-to-point connections, the actual points of connection stay the same no matter how you move the connected shapes.

Shape-to-shape connections



When you move shapes that have shape-to-shape connections, the connector attaches at the closest point between the shapes, which might be different from the original connection points.

Point-to-point connections



When you move shapes that have point-to-point connections, no matter how you arrange the shapes in relation to each other on the drawing page, the shapes maintain their original connection points.

To connect shapes automatically, shape-to-shape

1. Click the connector tool () on the Standard toolbar.
2. Drag a shape from a stencil onto the drawing page.
3. While the shape is still selected, drag another shape from a stencil onto the drawing page.

To connect shapes automatically, point-to-point

1. Use the pointer tool to drag two shapes, one at a time, from a stencil onto the drawing page.
2. On the Standard toolbar, click the connector tool, and then drag from a connection point on the first shape to a connection point on the second shape.

   The connection points turn red and the shapes are connected point-to-point.

NOTE *Because of their specialized behavior, certain shapes—such as those in the directory services solutions—cannot be connected using the point-to-point method. For details about a shape's behavior, right-click the shape and choose Help.*

Refining a diagram

Using Microsoft Visio 2000, you can enhance and modify diagrams by

- Adding text and color to shapes.
- Changing the direction of shapes by flipping and rotating them.
- Creating groups of shapes you can move as single units.

Adding and changing text

Text can clarify the meaning of your Visio diagrams, and you can use text to document changes you or other Visio users make to a diagram. You can turn on the text ruler to help you format text in a shape as you edit it.

NOTE *Because of their specialized behavior, you cannot add text to certain shapes—such as those in the UML solution—using the following methods. For details about a shape's behavior, right-click the shape and choose Help.*

To add text to a shape

- Select the shape and type the text you want.

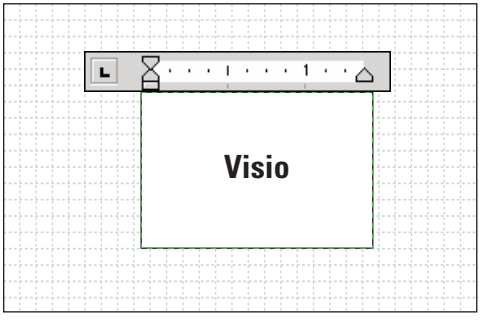
To edit existing text

- Double-click the shape to open the shape's text block, and then type.

To turn on the text ruler

1. Double-click a shape to open the shape's text block.
2. Right-click the shape with its text block selected, and then choose Text Ruler from the shortcut menu.

   The text ruler appears above the shape.



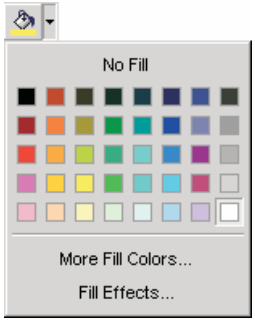
You can quickly change the settings for the selected text by dragging the tab stops and indent markers to the location you want on its text ruler.

Adding color and line styles to shapes

You can add color to shapes and instantly make your diagrams more visually dynamic. You can also change the format of lines and line ends in your diagrams. By applying line ends, you can turn any line into an arrow.

To view the fill color palette

- Click the arrow next to the Fill Color button on the Format toolbar.



Click More Fill Colors on the fill color palette for additional colors.

To apply color to a shape

- Select the shape and choose the fill color you want to use from the fill color palette.

To format a line style

- Select the shape and choose the Line Weight, Line Pattern, and Line Ends buttons on the Format toolbar to select the formatting you want to use.

Flipping and rotating shapes

You can change the direction and angle shapes face in your diagrams by flipping and rotating them. Select shapes and then use commands on the Tools menu or buttons on the Action toolbar to flip and rotate shapes.

To view the Action toolbar

- Choose View > Toolbars > Action.

Flip and rotate shapes with Action tools

Action	Tool
Flip a shape horizontally	
Flip a shape vertically	
Rotate a shape right	
Rotate a shape left	

Grouping shapes

You can group shapes so they function as a unit and so that you can regularly use them together.

To create a group

1. Drag the shapes you want to group, one at a time, from a stencil onto the drawing page.
2. Select the first shape, hold down the Shift key, and then click to select the other shapes one at a time.
3. Choose Shape > Grouping > Group.

You can import a graphic from another program to use in your diagram. Choose Insert > Picture, select the file format or type the path and name of the file you want to import, and then click Open.

Adding information to shapes

A Visio diagram is more than a picture—you can add information, called custom properties, to shapes and generate reports from them. Many Visio shapes come with custom property fields already assigned, but you can also define new custom property fields for shapes. You can then add data to the custom property fields, from which you can create and update reports.

To define and enter information for a new custom property

1. Right-click the shape and then choose Properties.
2. In the Custom Properties dialog box, click Define.
3. Click New, and then enter information to create a new custom property.
4. To enter information for a shape, right-click the shape and then choose Shape > Custom Properties. Enter the information you want for the custom properties listed.

Saving and printing your diagrams

The first time you save a diagram, Visio 2000 prompts you for document properties, such as whether or not to save a preview (a small thumbnail version of the diagram). The properties you specify appear in the Open dialog box when you select the diagram file name.

To save a new diagram

1. Choose File > Save or Save As.
2. For File Name, type a name for the drawing file.
3. For Save In, open the folder in which you want to save the file, and then click Save.
4. In the Properties dialog box, enter the information you want, and then click OK.

You can print your diagram by choosing File > Print or clicking the Print button () on the toolbar.

Sharing your diagrams with others

With Microsoft Visio 2000, you can add hyperlinks to shapes to make your diagram a launching point for users who want more detail and related information.

If your diagram requires input from co-workers or clients, you can use e-mail to route your diagram to others for comment and additional information.

Once your diagram is complete, publishing your diagrams to the Internet or an intranet site is as easy as saving a file. Visio 2000 automatically adds the HTML codes necessary to display the diagram in a Web browser, so all you have to do is make sure your diagram looks the way you want.

Adding hyperlinks to shapes and pages

You can add one or more hyperlinks to Visio shapes and drawing pages. A link can jump to another page in the same Visio diagram, another Visio diagram, or a non-Visio document. For example, you can link a Process shape in a flowchart to a Microsoft Word document containing Total Quality Management (TQM) documentation for that process.

When you add hyperlinks to other pages in the same Visio diagram, you can use them to move among pages in the Visio diagram.

When you link a shape or page to a file, you can decide whether the path to the link should be a relative path or an absolute path.

Relative path A relative path describes the location of the linked file in relation to the Visio diagram, or to another path. You can move the Visio diagram and the linked file together (that is, move the entire path structure) without breaking the link, but if you move the diagram or file separately, you break the link.

NOTE *To set a relative path that is not based on the location of the Visio diagram, choose File > Properties. On the Summary tab, for Hyperlink Base, type the base path that you want.*

Absolute path An absolute path spells out the exact location of the linked file in terms of drive, folder, and file name. You can move the Visio drawing file without affecting the link, but if you move the linked file, you must reset the path.

You can view the Professional Edition and Enterprise Edition User Guides *in PDF format, or view online Help on the Microsoft Visio 2000 Professional Edition or Enterprise Edition CD.*

To link a shape or page to another Visio drawing page, a Web page, or a non-Visio file

1 Create or open a Visio diagram.

- To add a link to a page, display the page with nothing selected.
- To add a link to a shape, select the shape.

> **NOTE** *If you are linking to a Visio 2000 diagram, make sure to save the diagram so that you can open the source to which you are linking.*

2 Choose Insert > Hyperlinks.

3 Do one of the following:

To link to a Web site For Address, type the Web site's URL. If you don't know the URL, click Browse, and then choose Internet Address to open your default Web browser. Use you Web browser to locate the Web site you want.

To link to a file For Address, click Browse, and then click Local File. Navigate to the file you want, and then click Open. (If necessary, change the type of file in Files Of Type.)

If you are linking to a file and you want to display a particular page, click Browse next to Sub-Address, select the page you want, and then click OK.

4 Under Description, type a name for the link that identifies the location you're linking to.

5 Do one of the following:

- To specify a relative path, leave Use Relative Path For Hyperlink checked.
- To specify an absolute path, uncheck Use Relative Path For Hyperlink.

6 *Optional* If you want to add another hyperlink for the selected shape or page, click New, and then repeat steps 3 through 5.

7 If you want to link to another page within the current Visio document, or to a shape in the document, click the Browse button to the right of Sub-Address, specify the page, shape, and zoom level you want, and then click OK.

Routing your diagrams for comments

You can use e-mail to send a Visio diagram to another user. For example, if you need information from co-workers to complete your diagram, you can route the diagram to them electronically and ask for their comments.

The Visio program also lets you take advantage of Microsoft Office routing features, including sending diagrams to Microsoft Exchange folders, adding routing slips to diagrams you send by means of e-mail, and adding journal entries to Microsoft Outlook.

NOTE *Visio products are compatible with e-mail programs that support the Messaging Application Programming Interface (MAPI) protocol.*

To send a diagram with a routing slip

1. Display the diagram you want to send, and then choose File > Send To > Routing Recipient.
2. In the Routing Slip dialog box, click Address to open your address list, select the individuals or groups to which you want to route your diagram, and then click OK.
3. If you want to route the diagram to people in a specific order, select a person's name, and then click the up or down arrow in the Move section to change that person's position in the list.
4. Under Route To Recipients, specify whether to route the diagram to one person at a time or to everyone at once.
5. Check Track Status to receive an update as each person on the list passes the diagram to the next person, or check Return When Done if you'd rather not see the diagram again until everyone has seen it.
6. Under Message Text, type the text you want in the e-mail message, and then click Add Slip.
7. Choose File > Send To > Next Routing Recipient to send the diagram to the first person on the routing list.

If you receive a routed diagram and want to route it to the next person, choose File > Next Routing Recipient.

Converting diagrams to HTML

After you create Visio 2000 diagrams, you can convert them into Web pages with links to other Web pages by saving them as HTML files.

To convert a diagram to an HTML file

1. Open the diagram you want to save as an HTML file, and then choose File > Save As.
2. Type a name for the HTML file, choose HTML Files (*.htm, *.html) for Save As Type, and then click Save
3. In the Save As HTML dialog box, accept the default settings, and then click OK.

   You are prompted to view the HTML pages.
4. Click Yes to view the new Web pages in your default browser.

NOTE *Visio 2000 provides support for VML (Vector Markup Language), which facilitates the exchange, delivery, and editing of high-quality vector graphics on the Web. You must have Microsoft Internet Explorer 5.0 installed to save a diagram in VML format.*

Develop custom solutions: create shapes, stencils, and templates

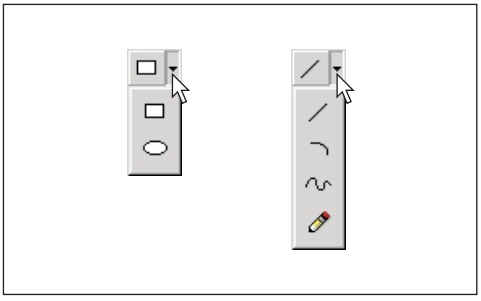
As well as providing you with ready-to-use solutions, Microsoft Visio 2000 gives you the flexibility to build your own. You can create your own shapes, stencils, styles, and templates that you and others can reuse. You can even build your own toolbars and menus that contain the tools and commands you use most frequently.

Creating your own shapes

There are several ways you can create your own shapes in Visio 2000. You can use Visio drawing tools to create a shape from scratch, merge a shape with other shapes to create a new unique shape, or revise an existing shape.

To draw a shape from scratch using the Visio drawing tools

- Choose a drawing tool from the Standard toolbar, and then click and drag on the drawing page to create the shape you want.



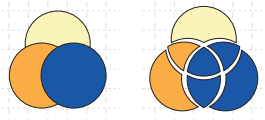
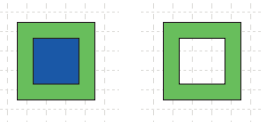
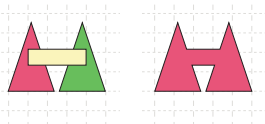
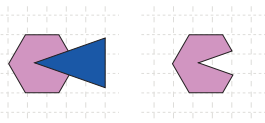
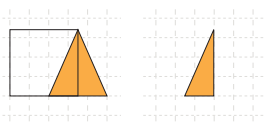
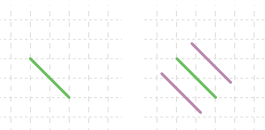
Click the arrow next to the rectangle tool and the line tool to see more Visio drawing tools.

To merge existing shapes to create new shapes

1. Select the shapes in your diagram that you want to use to create a new shape.
2. Choose Shape > Operations, and then choose the appropriate command.

NOTE *The new shape you create using any shape operations command inherits the formatting of the first shape you selected.*

Using shape operations commands

Command	Result	Example
Fragment	Breaks a shape into smaller parts or creates new shapes from intersecting lines or from 2-D shapes that overlap.	
Combine	Creates a new shape from selected shapes. If the selected shapes overlap, the area where they overlap is cut out (discarded), creating a cookie-cutter effect.	
Union	Creates a new shape from the perimeter of two or more overlapping shapes.	
Subtract	Creates a new shape by subtracting the area where selections overlap from the primary selection.	
Intersect	Creates a new shape from the area where the selected shapes overlap, eliminating non-overlapping areas.	
Offset	Creates a set of parallel lines or curves to the right and left of the original shape.	

When you use the pencil, line, rectangle, or ellipse tool, try holding down the Shift key while you draw, to see how that constrains the drawing behavior.

Adding your own shapes to stencils

If you want to reuse your own shapes the next time you open a particular drawing type, you can make them into masters by saving them to existing stencils in your diagram, and then saving the file as a template (.vst).

You can also create a new stencil, and then add your own shapes as well as any existing Visio shapes you want to it. Then, you can save the stencil in a template file, so that you and others can reuse it in other diagrams.

To add your own shape to an existing stencil

1. Open the template containing the stencil you want to add your own shape to.
2. Click the icon on the stencil title bar ( ), and then choose Edit from the menu.

   A red asterisk appears on the stencil icon ( ) to indicate that the stencil is editable.
3. Hold down the Ctrl key, and then drag your own shape from the drawing page onto the stencil.

   A new icon representing your own shape appears on the stencil with a generic name.
4. Click the new master on the stencil, click it again, and then type the name you want for the new master.
5. Click the stencil icon ( ), and then choose File > Save As to open the Save As dialog box. Navigate to the Solutions folder you want to save the stencil in, and then type a name for the stencil in the File Name box. For Save As Type, choose Stencil (*.vss), and then click Save to save your stencil.

To add your own shape to a new stencil

1. Choose File > Stencil > New Stencil.

   The new stencil appears docked to the left side of the drawing window, with a red asterisk ( ) to indicate that it is editable.
2. Hold down the Ctrl key, and then drag your own shapes, one at a time, from the drawing page onto the new stencil.
3. Click the Save icon ( ) on the right side of the stencil title bar.
4. In the Save As dialog box, navigate to the folder where you want to save the stencil, and then type a name for the stencil in the File Name box. Check to make sure Save As Type is Stencil (*.vss), and then click Save.

Creating your own template

You might want to create your own template when your diagrams

- Require customized settings such as page size or scale, window size and position, or shape or text styles.
- Often include a particular background or set of layers.

To create and save your own template

1. Open your diagram or start a new diagram based on the template you want to modify.
2. Open any additional stencils you want to save with the template by choosing File > Stencils > Open Stencil and then choosing the stencil(s) you want.
3. Change drawing page settings and styles to those you want to use in future drawings that are based on this template.
4. Choose File > Save As, and then do the following:
   - For Save As Type, select Template (*.vst).
   - For File Name, type a name for your template.
   - For Save, make sure Workspace is checked.
   - For Save In, select the folder in which you want to save the template.
5. Click Save.

Defining and editing styles

You can define styles that users can then apply to shapes in the diagrams they create. A style in Visio 2000 is a named collection of formatting attributes that you can apply to shapes. You can create styles that format the elements of a shape: fill, line, and text. For example, you might create a style that gives shapes a black outline, a green fill, and black bold italic text.

When you define or edit styles in a drawing file, the changes you make are available only in the current diagram. To make a style available for future diagrams, you can define or edit it in an existing template. The style is then included in every new diagram you create using that template.

To define a new style

1. Choose Format > Define Styles, and then type a name for the new style in the Style list.
2. If you want to base the new style on an existing style, select that style from the Based On list.
3. Under Includes, check the attributes that your style includes.
4. Under Change, click Text, Line, or Fill to change the settings for each attribute you included in Step 4.
5. Click Apply to add the new style and apply it to selected shapes.

To show or hide toolbars while you work, choose View > Toolbars, and then click to add or remove a check mark next to the toolbar you want to show or hide.

The network, database, and software solutions are applications with specialized functionality that run on the Visio engine. For information on developing your own solutions, refer to Developing Visio Solutions, *available in PDF format on the Visio 2000 Professional Edition or Enterprise Edition CD.*

To change a style

1. Choose Format > Define Styles, and then select the style you want to change in the Style list.
2. To rename the style, click the Rename button, type a new name in the Rename Style dialog box, and then click OK.
3. To change style settings, click the Change button. When you finish changing the attributes, do one of the following:
   - Click Apply.
   - Click Change to add the changes and continue working in the dialog box.

Creating your own toolbars

You can create your own toolbars in Visio 2000, so you can work more efficiently, using only the tools you need as you create your diagrams.

To create your own toolbar

1. Choose View > Toolbars > Customize.
2. On the Toolbars tab, click New, type a name for the new custom toolbar, and then click OK.
3. Click the Commands tab, and then from the Categories list, select the category that contains the command for which you want to create a button.
4. Drag the commands you want to include, one at a time, from the Commands list to the toolbar.

To attach a custom menu or toolbar to the drawing file so others can use it

1. Choose View > Toolbars > Customize, and then click Attach.
2. In the Custom Toolbars list, select a toolbar to include in the drawing file, and then click Copy.
3. When all of the toolbars you want in the drawing file are listed in the Toolbars In Document list, click OK.

CHAPTER 2

Network and directory services diagramming, design, and documentation

Whether you're making an inventory of an existing network, upgrading to Microsoft® Windows® 2000 and Active Directory™, or adapting new widescale communications technologies such as Voice over IP (VoIP) or wireless, the Microsoft Visio® 2000 IT solutions for networking can help you streamline the planning, implementation, and management of your networks.

You can visualize your existing network with the industry-standard tools in Microsoft Visio 2000 Professional Edition for quickly and efficiently diagramming high-level network topologies. You can troubleshoot your network's infrastructure with ease, because you have accurate and detailed information to refer to.

Microsoft Visio 2000 Enterprise Edition offers all of the diagramming features in Professional Edition, plus powerful automated tools for network design and documentation.

In this chapter

Comparing networking and directory services solutions in Professional Edition and Enterprise Edition

The networking solutions in Microsoft Visio 2000 Professional Edition and Enterprise Edition offer powerful tools to assist you in the design of robust, efficient networks.

Professional Edition provides tools for visualizing proposed or existing high-level LAN/WAN topologies, and diagramming directory services.

With Enterprise Edition you can automatically generate network documentation using Auto-Discovery™ technology and more than 18,000 vendor-specific device shapes, and import directory services schemas and objects from leading directory services vendors to plan for changes or migrations.

The following tables can help you compare Professional Edition with Enterprise Edition so you can choose the edition that best suits your organization's needs.

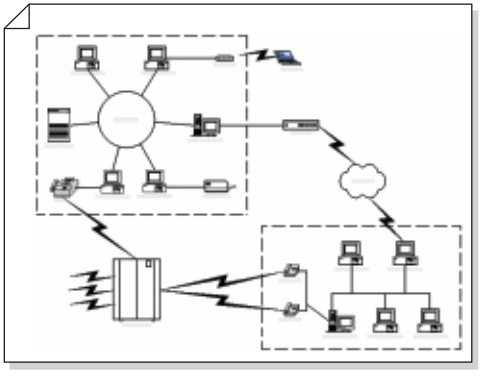
Networking solution features	Professional Edition	Enterprise Edition
Generic network shapes Create and manage physical and logical network diagrams and associate data, such as manufacturer, product name, and model number, with network shapes for tracking equipment and generating inventories or bills of materials.	Yes	Yes
Visio Network Equipment shapes Choose from a library of more than 18,000 manufacturer-specific shapes, from 375 network vendors, that you can use in your diagrams. If you have Enterprise Edition, you can use these shapes in the diagrams you create using the AutoDiscovery technology.	Sampler of shapes	18,000+
AutoDiscovery technology Use SNMP (Simple Network Management Protocol) to locate network devices and automatically build a comprehensive database of layer 2 (data link), layer 3 (network layer), and frame relay network information.	No	Yes
Inventory and materials reports Populate ready-to-use network reports, with which you can automatically turn network data into presentation-quality documentation.	Yes	Yes
Automated reports Choose from among 20 automated reports in the AutoDiscovery and Layout solution to inventory IP addresses, summarize frame relay data, and track changes to your network topology.	No	Yes

Directory services solution features	Professional Edition	Enterprise Edition
Directory services diagrams Diagram Microsoft Active Directory, LDAP-based, and Novell Directory Services® structures.	Yes	Yes
Directory services import and export Automatically document existing directory structures imported from Microsoft Active Directory, LDAP-based vendors, and Novell Directory Services. Export to an LDIF file that you can import to an LDAP-compliant directory service.	No	Yes

Visualizing and planning your network

The Network Diagram solution simplifies the process of designing and documenting LANs, WANs, and telecommunications infrastructures. The solution includes

- Network shapes, most of which are manufacturer-specific, representing equipment made by Cisco Systems, 3Com, Bay Networks, Cabletron, Hewlett Packard, and others.
- Custom properties associated with shapes to which you can add data and from which you can produce reports and database tables.



Use network diagrams to plan and document simple networks and to track equipment by associating serial number and location data with shapes.

To create a network diagram

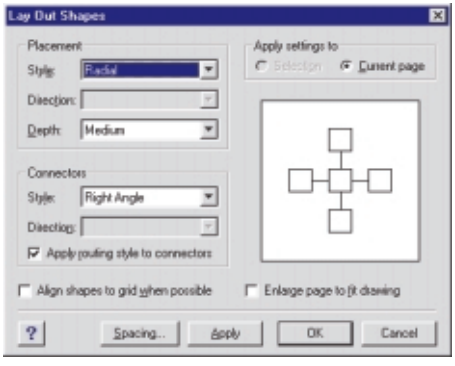
1. Start Microsoft Visio 2000. In the Welcome To Microsoft Visio dialog box, click OK.
2. Click Network Diagram, and then in the Drawing Type box, double-click Logical Network Diagram.
3. From the Logical Symbols stencil, drag an Ethernet, ring, bus, or other network shape onto the drawing page.
4. Drag workstation shapes and other shapes onto the drawing page.
5. Select the ring, bus, or Ethernet shape, and then place the pointer over a control handle. When the pointer changes to a four-headed arrow, drag it to a connection point (⤫) on one of the surrounding shapes.
6. Repeat step 5 as necessary to connect the shapes.

To enter custom property data for a shape

- Right-click the shape, and then choose Properties from the shortcut menu.

To generate a report

1. Choose Tools > Property Report.
2. Follow the instructions in the Property Reporting Wizard to generate your report.



You can use the Lay Out Shapes command to have Visio 2000 position shapes in your network diagram automatically. Open the network diagram you want to lay out, and then choose Tools > Lay Out Shapes. Experiment with the Placement settings to find a style, direction, and depth you like.

Diagramming, designing, and documenting directory services

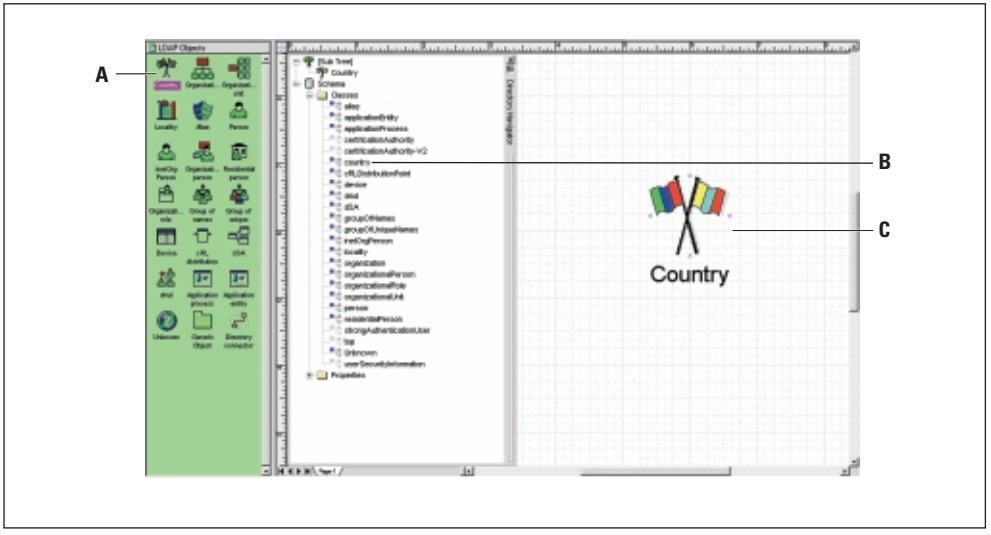
With the directory services solutions in Microsoft Visio 2000 Professional Edition and Enterprise Edition, you can design new directories, create alternative designs for existing directories, or create a plan for updating or migrating your current network's directory services. You can plan and allocate current and future network resources and design policies and guidelines before the physical network is in place.

Professional Edition: diagram directory services

The Professional Edition directory services solutions contain all the templates and objects you need for creating quick and professional directory service diagrams from the following:

- Microsoft Active Directory
- LDAP (Lightweight Directory Access Protocol)
- Novell Directory Services (NDS)

A directory service is a repository of information about network resources, such as hardware, software, users, or policies. Each resource is represented in the solution by an icon, called an object, which contains specific information about itself and about its relationship to other objects.



Professional Edition and Enterprise Edition directory services solutions automatically open the Directory Navigator, a separate window that displays the structure of the directory in a tree view as you add objects (also called views) to the directory diagram. Here, the Country shape appears on the stencil (**A**). After it is dragged from the stencil to the drawing page it appears in both the Directory Navigator in the context of the directory's structure (**B**) and in the diagram (**C**).

You can use the LDAP solution to diagram Netscape or Microsoft Exchange directories.

To create a directory services diagram

1. Start Microsoft Visio 2000. In the Welcome To Microsoft Visio dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Network Diagram.
3. Choose the directory service you want to document, and then click OK.

   The solution opens with a default schema of classes and properties for that service.
4. Drag shapes from the stencil onto the directory diagram to add the shapes to the diagram and to the [Sub Tree] level of the Directory Navigator.

   Or, make a shape the child of an existing object by dragging the shape from the stencil and dropping it on top of the object you want to be its parent in the directory diagram. The shapes are connected in the directory diagram with a Directory Connector (), and the relationship is added in the Directory Navigator.

To modify an object by adding values and extended properties

1. Right-click an object in the diagram or in the Directory Navigator, and then choose Edit Properties from the shortcut menu.

   The Edit Properties dialog box opens with the properties displayed for the object. The object's name appears at the top of the dialog box.
2. In the Edit Properties dialog box, do the following.

   Show Optional Properties Check to show the optional properties for the object.

   Value field Enter a value for each property to which you want to assign a value.

   Show Extended Properties Check to show the extended properties for this object.

   Add Click to assign another extended property.

Enterprise Edition: document directory services

Enterprise Edition includes all of the directory diagramming features in Professional Edition, plus support for importing directly from a directory service database. You can even filter the objects you want to import, and then let Enterprise Edition build the diagram for you as you drag objects from the Directory Navigator.

In addition, Enterprise Edition supports exporting directory diagrams as LDIF (LDAP Data Interchange Format) files. LDIF is the industry-standard file format for directories; the LDIF file can be imported into a directory service (Active Directory, LDAP, or NDS) or third-party application.

NOTE *You cannot import an LDIF file into a directory service using Microsoft Visio 2000. You must use that directory service's importing capabilities.*

To connect to a server and import

1. Start Microsoft Visio 2000 Enterprise Edition, choose the directory service you want to document, and then click OK.
2. In the Connect To Directory dialog box, select Import From A Live Directory.
3. Click Browse to navigate to the server you want to connect to.
4. Click OK to return to the Connect To Directory dialog box.

   The directory path of the object you are selecting to import appears in the Directory Object field. Reading from left to right, the Directory Object field displays the location of the object in the tree from the selected object to the [Sub Tree] level.
5. In the Filter Options section, select the types of classes you want to import.

   All Classes Imports all classes.

   Common Container Classes Imports a predefined set of classes.

   Selected Classes Gives you the common containers and specific classes to import.
6. In the Import Depth section, enter a value that indicates the import depth level you want.

   The import depth level indicates the number of subsequent child levels for the selected directory object that you want to import. For example, if you import an Organizational Unit class and you enter *3* in the Import Depth field, you will import all child objects down to and including those that are three levels below the Organizational Unit.
7. Click OK.

   The Connect To Directory dialog box closes. The [Sub Tree] icon appears in the Directory Navigator along with a schema based on the directory services solution you selected. You can now manually model a network by dragging objects onto your directory diagram, add values to objects, and rearrange the layout of the objects.

NOTE *If you have not imported all objects from a directory service, you can import additional objects into the Directory Navigator.*

To export your diagram to an LDIF file format

1. Choose Directory Services > Export To LDIF > Export Entries or Export Changes.

   NOTE *The Export Entries command exports the diagram in LDIF "Entry" format. The Export Changes command exports the directory diagram in LDIF "Change" format.*
2. Type a name for the file.
3. Select LDIF File*.ldf for Save As Type, and then click Save.

   The diagram is exported to an LDIF file format.

   NOTE *Many directory services will not successfully import the generated LDIF file unless you have filled out the mandatory attributes on any objects you've created.*

Automatically discovering, diagramming, and reporting on your network

Microsoft Visio 2000 Enterprise Edition includes the AutoDiscovery and Layout solution, a powerful set of tools that searches your network, polls devices, gathers information about the layer 2 and layer 3 devices, and then creates a database with the information.

You can use the solution's Discovery Wizard to customize discovery to include only specific networks or devices, to specify whether discovery uses SNMP or PING to find devices, and to determine the order in which SNMP community strings are used.

The AutoDiscovery and Layout toolbar appears when you open a network diagram using the AutoDiscovery and Layout template (AutoDiscovery and Layout.vst). You can also right-click a device on the diagram to display a shortcut menu with additional context-sensitive commands, and choose commands from the AutoDiscovery menu.

AutoDiscovery toolbar buttons

Button	Name and action
	**Discovery** Starts the Discovery Wizard used to discover your network.
	**Add Networks** Adds a network to the drawing page to use as the starting point of your diagram.
	**Add Devices** Accesses the AutoLayout feature used to create a hyperlinked network diagram.
	**AutoLayout** Automatically create simple diagrams of your network and stores the discovered data in an MSDE database.
	**Network Reporting Wizard** Accesses the Reporting feature, which allows you to create reports using the discovered network data.
	**Guided Update** Starts the Guided Updating™ feature and displays a window that lists the devices, interfaces, and networks that have been added to, or changed on, your network.
	**Database Viewer** Opens the Database Viewer, where you can delete and rename objects in the database, set the CIR (Committed Information Rate) for DLCIs (Data Link Connection Identifiers), set interface speeds, and change a device class.
	**Network Diagramming Assistant** Accesses the Network Diagramming Assistant for help on what to do next.

To open the AutoDiscovery and Layout template

1. Start Microsoft Visio 2000. In the Welcome To Microsoft Visio dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Network Diagram, and then double-click AutoDiscovery and Layout.

To use the Discovery Wizard

1. Choose File > New > Network Diagram > AutoDiscovery And Layout.
2. Choose AutoDiscovery > Discovery > Discovery, or click the Discovery button () on the AutoDiscovery and Layout toolbar.
3. Complete the wizard screens.
4. Create a diagram.

Factors affecting discovery time

Factor	Description
The number of device types discovery looks for	The more options you select in the Discovery Wizard, such as types of devices to be discovered and the number of specified discovery domains, the longer discovery will take.
The PING and SNMP timeout settings	You can specify how long discovery waits before timing out if a device doesn't respond to a PING or SNMP request. You can decrease the SNMP timeout value if you have many devices that don't respond to SNMP requests.
Link speeds	WAN links take longer to discover than LAN links.
ARP and router table size	The larger the tables, the longer discovery will take.

Updating the diagram with network changes

You can view and incorporate network changes by using the Guided Update command after you rerun discovery to display a list of the components on your network that were added, modified, or deleted since the last time you discovered the network.

The following changes are displayed in the Guided Update window in a tree view.

Network Changes Shows devices added to or deleted from the network.

Device Changes Shows new or deleted interfaces.

New Objects Shows new network objects.

Connectivity Changes Shows new or deleted data link connections.

In the Guided Update window, you can

- Apply the changes to your diagram immediately.
- Save the changes to a file to apply to your diagram at another time. The next time you run Guided Update, the new changes are displayed in the Guided Update window, and the previous changes are overwritten. You can then open the saved file to apply the previous changes.
- Load a previously saved file of network changes.

To update your diagram

- Click the Guided Update button () on the AutoDiscovery and Layout toolbar.

Reporting on your network

Using the AutoDiscovery and Layout solution, you can quickly create tabular and textual reports of your network's status by extracting your network data from the database. You can quickly inventory IP addresses, summarize frame relay data, track changes to your network topology, and more. Reports are generated as Visio drawing (.vsd) files, so you can easily publish them to the Web.

To generate a network report on a device in your diagram

1. Right-click the device you want to report on and choose Generate Report.
2. In the Report Template field, choose a report template from the list box.
3. Choose the Output Options for your report.
4. Click OK.

Sample network report

Devices by Manufacturer
Network Reports for Microsoft Visio

HP and Sun

Device	IP Address	Description
HP	10.1.1.200	HPJ3100B HP Switch 2000, revision B.03.01, ROM
sparc10c	10.75.50.31	SunOS sparc10c 5.5.1 Generic_103640-24 sun4m
sparc10b	10.75.50.29	SunOS sparc10b 5.6 Generic_105181-12 sun4m
hp6.lab.sssys.com	10.75.50.22	HP-UX hp6 B.10.20 A 9000/710 2005818370
hp5.lab.sssys.com	10.75.50.21	HP-UX hp5 B.10.20 A 9000/715 2003697940
hp4.lab.sssys.com	10.75.50.20	HP-UX hp4 B.11.00 A 9000/735 2011751462
Sparc2B	10.75.50.12	SunOS Sparc2B 5.5.1 Generic_103640-24 sun4c
hp2.lab.sssys.com	10.75.50.6	HP-UX hp2 B.10.20 A 9000/720 2010272657
sparc20	10.75.50.5	SunOS sparc20 5.7 Generic sun4m
hp3	10.75.50.3	HP-UX hp3 B.10.20 A 9000/715 2015119024

Cisco Systems

Device	IP Address	Description
C1900-4	10.10.1.203	Cisco Systems Catalyst 1900
C1900-5	10.10.1.205	Cisco Systems Catalyst 1900
C2820	10.10.1.204	Cisco Systems Catalyst 2820
CAT2900-1	10.10.1.206	Cisco Systems WS-C2900
10.10.1.200	10.10.1.200	Cisco Systems WS-C5000
CAT2820-1	10.200.1.30	Cisco Systems Catalyst 2820
CAT3000-2	10.200.1.20	Cisco Catalyst System
LS1-C5000	10.20.1.12	Cisco Systems WS-C5000
LS1-C5500	10.20.1.11	Cisco Systems WS-C5500
LS2-C1900	10.20.1.123	Cisco Systems Catalyst 1900
LS2-1900	10.20.1.122	Cisco Systems Catalyst 1900

Using manufacturer-specific shapes for precise network diagrams

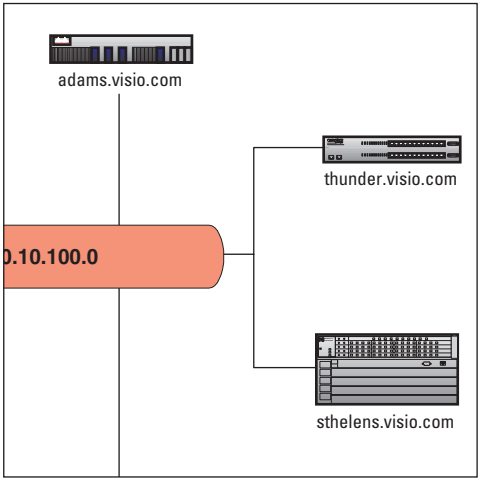
The AutoDiscovery and Layout solution in Enterprise Edition uses shapes that are assigned to network objects by matching the SysObjectID of the device to a shape found on the stencils in the Microsoft Visio 2000 Network Diagram solution. A SysObjectID is a value obtained using SNMP that vendors use to identify their products.

Enterprise Edition also includes the Visio Network Equipment solution, which is a collection of over 18,000 detailed network shapes from over 375 hardware manufacturers. Every Visio Network Equipment shape also includes a hardware-specific custom property dialog box with tabs to store data on asset, equipment, maintenance and network properties. Some fields are even pre-populated with AutoDiscovery data.

When you use these shapes in conjunction with the AutoDiscovery and Layout solution, Enterprise Edition maps network device types to the correct Visio Network Equipment shapes and automatically populates shape properties with discovered data, such as name, address, make, and speed. This information is stored in the Visio Network Equipment database and is continually updated with new stencils. If a specific Visio Network Equipment shape is not available for a discovered object, a default shape is used.

You can also use shapes that you have created or shapes from other stencils. The shapes you specify to use for network and device mappings take precedence over the AutoDiscovery and Layout solution's default mappings.

NOTE *When you change the default shape mapping of a device type or network object, the new mapping is used the next time that device is imported into your diagram. It does not affect shapes currently in a diagram.*



This diagram uses Visio Network Equipment shapes instead of AutoDiscovery and Layout shapes.

To use other device shapes instead of the default AutoDiscovery and Layout template shapes

1. Choose AutoDiscovery > Configuration > Map Shapes.

   On the Default Shapes tab, do the following:

   Default Object Types Choose a device type.

   Stencils Choose Browse to locate a stencil (.vss file) you want to use.

   Shapes Select a shape to map to the device type, and then click Map.

2. Click OK.

NOTE *Enterprise Edition includes the Locate Network Equipment utility, which you can use to find shapes by keyword (such as name) or by category (such as type, manufacturer, or product line). You can locate only Visio Network Equipment and logical network shapes with the Locate Network Equipment utility.*

CHAPTER 3

Database diagramming, design, and documentation

The Microsoft® Visio® 2000 IT solutions for database professionals provide you with the tools to tackle today's information management challenges, whether you're supporting a transition to e-commerce, implementing a Customer Relationship Management (CRM) system, or moving from the decentralized, department-level use of software to integration of multiple applications enterprisewide.

With the easy-to-use, industry-standard tools for rapid visualization in Microsoft Visio 2000 Professional Edition, you can diagram proposed database structures using entity relationship notation. You can also reverse engineer existing systems from the leading client/server and database vendors down to code-level detail.

Microsoft Visio 2000 Enterprise Edition offers all of the features in Professional Edition, plus powerful automated tools for synchronizing models and databases, facilitating collaborative database design, and generating models and schemas from natural-language business rules.

In this chapter

Comparing database solutions in Professional Edition and Enterprise Edition

You can view the Professional Edition and Enterprise Edition user guides in PDF format, or view online Help, on your Microsoft Visio 2000 CD.

The database solutions in Professional Edition and Enterprise Edition provide powerful tools for designing databases. As the following table shows, Professional Edition packs a wealth of database diagramming features into one affordable box. Enterprise Edition delivers a complete, automated database design and documentation solution for the development and maintenance of reliable, flexible system architectures.

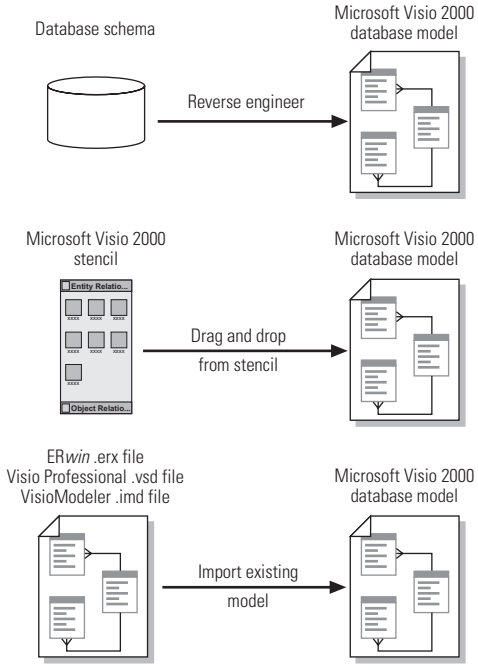
For a complete list of the database solutions in Professional Edition and Enterprise Edition, see the table "Database modeling solutions" on page 12.

Database solution features	Professional Edition	Enterprise Edition
Reverse engineering Reverse engineer existing databases to visualize systems to code-level detail, displaying views, triggers, check clauses, and stored procedures.	Yes	Yes
Multiple notation support Design new databases using relational, IDEF1X, or Crow's Foot notation.	Yes	Yes
Model and database synchronization Model your database schema, and generate a database from the model. Keep the model and database in sync by automatically comparing and updating each with changes made to the other.	No	Yes
Workgroup collaboration tools Merge individual database diagrams into a single model.	No	Yes
Database reports Create customizable reports with complete information about database models.	No	Yes
ORM Diagram template Create conceptual Object Role Modeling (ORM) diagrams.	Yes	No
Natural language business rules Enter database information as natural language business rules using the ORM Source Model template. Populate the model with real-world examples or select items from a drop-down list to specify relationship constraints.	No	Yes
Database schema generation Map ORM diagrams to correctly normalized entity relationship models and automatically generate database schemas.	No	Yes
Error checking Dynamically verify the correct use of the database notation. Check database models for DBMS-specific errors.	No	Yes
Microsoft Repository integration Use Microsoft Repository to generate, reverse engineer, or update Visio 2000 database models, enabling interaction with other tools, such as Microsoft Visual Studio® or PLATINUM ER*win*.	No	Yes

Model-based database design

Microsoft Visio 2000 Professional Edition and Enterprise Edition provide powerful database tools you can use to create conceptual, logical, and physical model diagrams for relational and object-relational databases.

A database model diagram can help you design a complete, accurate, and efficient database by graphically showing the relationships among the objects, primary keys, and any errors in the design.



With the Database solution in Microsoft Visio 2000 you can reverse engineer a database to create a model; create database model diagrams from scratch using relational and object-relational (including Crow's Foot) or IDEF1X notation; or import an existing model from VisioModeler, Visio 5.0, or PLATINUM ER*win*.

Reverse engineering a database to create a model

You can create a model from a legacy database using the Database Model Diagram solution in Professional Edition or Enterprise Edition.

Reverse engineering, a widely used method for creating models, allows you to improve, enhance, document, and extend existing databases.

In addition to a generic ODBC (Open Database Connectivity) driver and a generic OLE DB provider, Microsoft Visio 2000 includes its own database drivers for the following DBMSs:

Desktop database drivers

- Corel Paradox 7, 8
- Inprise/Borland dBASE III, IV, 5; Inprise/Borland Paradox 3, 4.x, 5
- Microsoft Access 2.0, 7.0, 97, 2000; Microsoft FoxPro® 2.0, 2.5, 2.6; Microsoft Visual FoxPro® 5.0, 6.0

Client/server database drivers

- IBM DB2 Universal Database 2.1.2, 5.0
- Informix Dynamic Server, with support for the Universal Data Option; INFORMIX–SE 5.0; INFORMIX–OnLine 7.x; INFORMIX–Universal Server
- Microsoft SQL Server 4.2, 6.0, 6.5, 7.0
- Oracle 7.x, 8
- Sybase Adaptive Server 10, 11.x (formerly Sybase System); Sybase Adaptive Server Anywhere 6.x; Sybase SQL Anywhere 5.x

Microsoft Database Information Model driver

- **Enterprise Edition only** Microsoft DBM Repository

When you reverse engineer a database, you extract the schema from a database into a logical model. Your model can represent either relational or object-relational databases, and can use either IDEF1X or Relational notation.

To see how this process works, try using the Reverse Engineer Wizard on any sample database you have.

To reverse engineer a database

1. In Microsoft Visio 2000 Professional Edition or Enterprise Edition, choose File > New > Database > Database Model Diagram.
2. Choose Database > Reverse Engineer to start the Reverse Engineer Wizard.
3. Follow the instructions in the wizard.
4. Drag tables from the Tables window to the diagram.

Connecting to a database

The models you create with the database solutions in Enterprise Edition are independent of their implementation on any particular DBMS. This independence allows you the flexibility to implement a model on more than one DBMS, or to reverse engineer a model from one DBMS, modify it, and then implement it on a different system. Enterprise Edition also provides full support for Microsoft Repository, which you can use to share and exchange database models.

When you reverse engineer a database to create a model, generate a new database from a model, or synchronize a model with a database you must translate the portable information in the model into a particular physical implementation for the target DBMS. When you perform any of these tasks, you connect to the target database using a Visio database driver, an associated vendor-supplied ODBC driver, and a data source. If you are storing your database in Microsoft Repository, you can use the DBM Repository driver.

The Visio database drivers are specially written to access the features of leading DBMSs, and are used in conjunction with standard vendor-supplied 32-bit ODBC drivers, which manage the actual connection to the database. The Visio drivers contain information about a DBMS's physical implementation requirements, and they can extract code for views, triggers, check clauses, and stored procedures. Before you connect to a database, you must associate a Visio driver with an ODBC driver. For the association to work properly, you must select drivers that are designed to support the same DBMS.

A data source contains information about the data you want to use and crucial information about accessing it. You can create data sources using the system-level Microsoft ODBC Data Source Administrator, or you can create them as you work in the Reverse Engineer Wizard, Generate Wizard, Update Database Wizard, or Refresh Model Wizard. Data sources you create in Enterprise Edition can be managed using the ODBC Data Source Administrator.

Working in a database model diagram

Enterprise Edition includes seven different preformatted report types you can use to create, print, preview, and export comprehensive reports based on the contents of your current database model diagram. Choose Database > Report to launch the New Report Wizard.

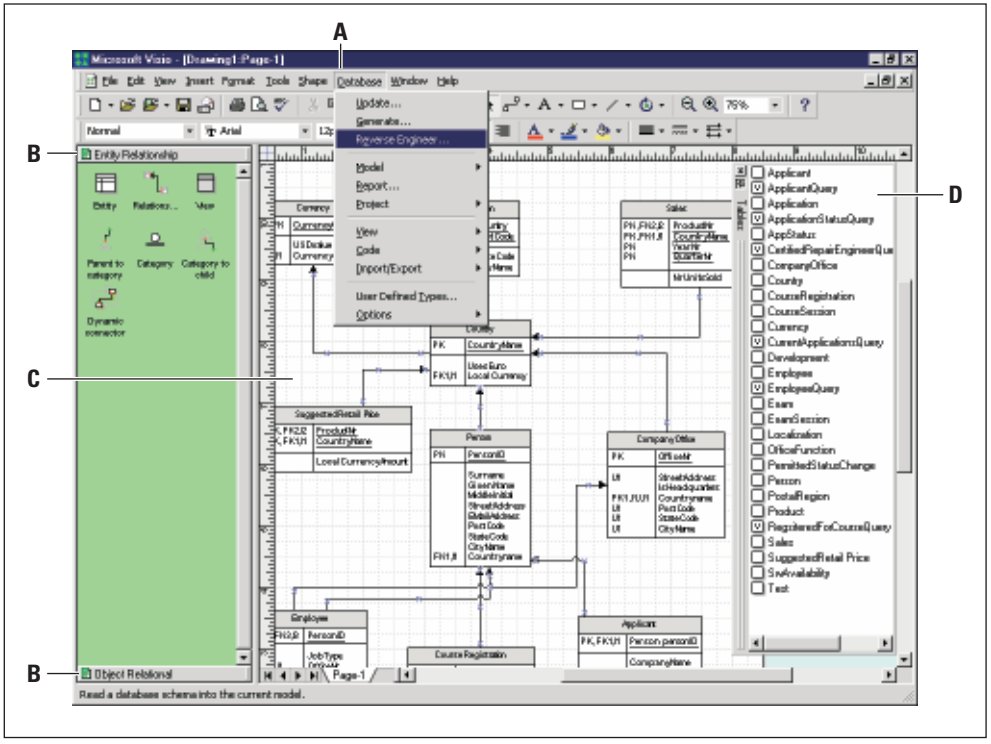
When you create a database model in the Database Model Diagram template, the shapes in the diagram represent the elements you want the database to store information about and the relationships among those elements. You can include other information in your model, such as code for stored procedures, although such information might not be visible on the drawing page.

When you're working in a database model, you can customize its appearance. Microsoft Visio 2000 Professional Edition and Enterprise Edition support IDEF1X and Relational notation, and you can display relationships in either notation using Crow's Foot symbols. In addition to specifying notation for the entire model, you can change the way individual elements in the model appear.

To choose display options

1. Choose Database > Options > Document.
2. Click the tabs in the Database Document Options dialog box to view and select options.
3. Click OK.

NOTE *Depending on the Microsoft Visio 2000 IT product and the options you select, Microsoft Visio 2000 installs as many as seven templates in the \Visio\Solutions\Database folder. The Bachman, Chen ERD, Database Model Diagram, Express-G, Martin ERD, and ORM Diagram templates are installed with Professional Edition. With the exception of the ORM Diagram template, Enterprise Edition includes all the above, along with the additional templates ER Source Model and ORM Source Model. This topic focuses on functionality in the Database Model Diagram template, which is available in both products. For details about other templates installed in the Database folder, see online Help. For details about which templates come with which product, see* *"Comparing Professional Edition and Enterprise Edition" on page 11.*



The Microsoft Visio user interface for creating database models

A Choose commands for creating and refining models from the Database menu.

B Drag shapes from stencils into the diagram to add new elements to the model.

C Assemble shapes in the diagram to represent the database model.

D Refine your model by working with elements in the anchored windows.

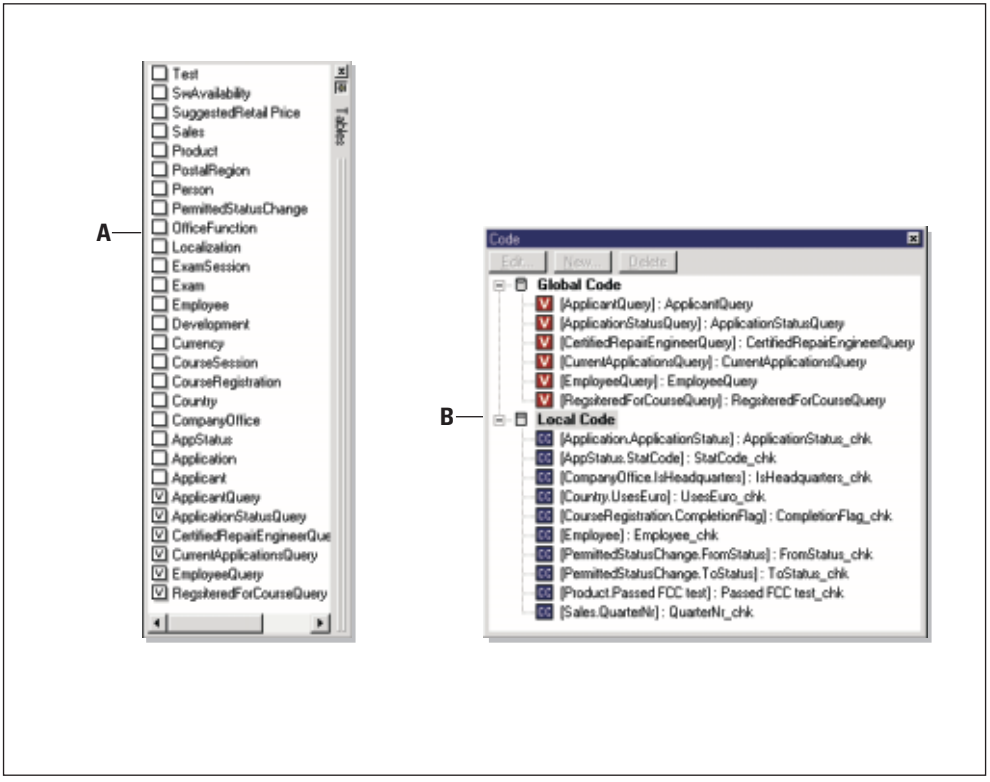
Refining a database model

Once you've created a database model diagram in Professional Edition or Enterprise Edition, you can add, modify, or delete elements such as tables, columns, and relationships. In Enterprise Edition, you can also set advanced options such as custom data types and stored code.

You can further refine a database model diagram by using the anchored windows associated with the template you're working in. Both Professional Edition and Enterprise Edition include the Database Properties, Tables, Code, Output, and Types windows. Enterprise Edition also includes the Project and Verbalizer windows.

Anchored windows

The Tables window (**A**), Code window (**B**), and other anchored windows provide a convenient way to access advanced options for refining a database model diagram.



To open the Database Properties window

- Double-click an element in the model diagram.

> **TIP** *You can also right-click an element and choose Database Properties from the shortcut menu to display the Database Properties window.*

To open the other windows

- Choose Database > View, and then choose the window you want to display.

Editing tables

Tables are the basic building blocks of a database model, and represent the things about which your database stores information. As you refine a database, you might change a table's name, create or edit primary keys to identify it more specifically, define indexes to make searching quicker, or customize code stored with the table in the form of triggers and check clauses.

To add a new table to a database model

1. Open the drawing file that represents your model.
2. From either the Entity Relationship or Object Relational stencil, drag an Entity shape onto the model diagram.

To edit the properties of a table

1. Double-click the table whose properties you want to edit.
2. In the Database Properties window, click the tab that contains the information you want to edit, and make your changes.

   The database model diagram is updated automatically. You can choose Edit > Undo to reverse the changes.

   Here is a brief description of each tab and the options it contains:

   Definition Specify physical and conceptual names for the table and whether to synchronize the names. You can specify a name space value for the table to distinguish it from identically named tables in the model. This tab also displays information reported by the host database management system (DBMS) about the database owner and the path of the source database. The Defining Type field is available only when a table is empty, and it lists all composite data types so that you can create a typed table.

   Columns Add columns to a table and edit the properties of columns in a table.

   Primary ID Edit, define, or delete primary keys from a list of available columns and specify whether to create an index of primary keys.

   Indexes Create, edit, define, rename, delete, or set extended attributes for indexes. Use this tab to specify the type of index you create for a particular column.

   Triggers Add, edit, remove, or preview the code for triggers that are included in the DDL (Data Definition Language) script created when you use the Generate Wizard or Update Database Wizard.

Check Add, edit, remove, or preview the code for check clauses that are included in the DDL script created when you use the Generate Wizard or Update Database Wizard.

Extended Set DBMS-specific extended attributes for use with the Visio 2000 database drivers.

Notes Type text to document the table. Text you enter here appears in the Verbalizer window.

TIP *You can use the Pushpin (📌) in the Database Properties window to turn on Auto-Hide. Auto-Hide minimizes the docked window when you move your pointer outside of its border. When the window is hidden, you must move the pointer over the window bar to make the window reappear.*

To create or edit a primary key for a table

1. Double-click the table to which you want to add a primary key. In the Database Properties window, click the Primary ID tab.

   NOTE *You can use the navigational arrows to the right of the tabs to display additional tabs.*

2. In the Available Columns list, select the column you want to be the primary key, and use the Move button (>) to move it to the Primary ID Columns list.

   Optional Instead of clicking the Primary ID tab, click the Columns tab, and then check the PK box for each column you want to include in the primary key.

Editing columns

Each table contains one or more columns that represent specific attributes of the table; columns are assigned specific data types. Each table must have at least one primary key column that is used to uniquely identify the table. In addition, columns can be identified as alternate keys (unique attributes that have not been defined as primary keys) or foreign keys (placeholders or pointers to a column in a parent table). As you refine a model, you may want to add new columns to or delete columns from a table, change a column's name, or assign a different data type to a column.

To edit the properties of a column in a table

1. Double-click the table containing the column you want to edit, and then click the Columns tab in the Database Properties window.
2. Select a column you want to edit by clicking its name, and then click Edit to open the Column Properties dialog box.
3. In the Column Properties dialog box, click the tab that contains the information you want to edit, and then make your changes.

   The database model diagram and the Columns tab of the Database Properties window are updated automatically. You can choose Edit > Undo to reverse the changes.

Here is a brief description of each tab and the options it contains:

Definition Enter or edit a Physical Name to control the column's name in the database or a Conceptual Name to control the column's name as it appears in the model. Check Allow NULL Values to make the column optional rather than mandatory.

Data Type Display either Portable Data Types or Physical Data Types, and assign Data Types to columns.

Collection Specify whether the column is a single value or contains a collection of information. Collections may be sets, lists, or multiple values, and may only be used in object-relational models.

Check Edit, add, remove, or preview check clauses that are included in the DDL script that you can create in the Generate Wizard or Update Database Wizard.

Extended Set DBMS-specific extended attributes for use with the Visio 2000 database drivers.

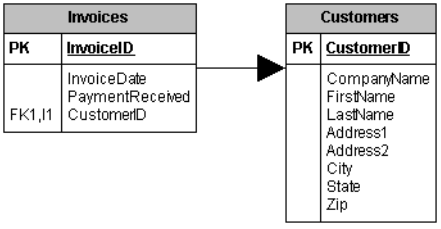
Notes Type text to document the column.

4 Click OK to close the Column Properties dialog box.

Editing relationships

Relationship shapes visually indicate how the tables in a model interact. Editing the properties of a relationship allows you to control how data is stored in and retrieved from a database. When you define a relationship, you specify which columns in a parent (originating) table are inherited by the child (receiving) table. The columns that are inherited become foreign keys in the child table.

You can also specify both referential integrity and cardinality settings when you define or edit a relationship. Referential integrity settings determine what happens to a foreign key when the parent table is modified. Cardinality defines the ratio of instances of a data value in a child table relative to the parent table.



Relationship shapes show the relationship between parent and child tables. In this example, Invoices (the child table) has inherited CustomerID as a foreign key from Customers (the parent table).

As you refine your database model, you can validate it periodically to ensure it is free of logical errors and is valid for the target DBMS by choosing Database > Error Check.

To create a foreign key relationship between tables

1. Open the drawing file that represents your database model.
2. Add at least two table entities to your model by dragging instances of the Entity shape onto the diagram.
3. Add columns to each table by double-clicking the table, clicking the Columns tab in the Database Properties window, and then clicking Add once for each column. Assign a primary key by clicking in the PK box for a column.
4. Define a foreign key relationship by dragging a Relationship shape onto the diagram. Drag the end of the Relationship shape that indicates the parent to the parent table, and release the mouse button when the table is outlined in red. Connect the other end of the Relationship shape to the child table in the same way.

   In ER notation, the arrowhead end of the Relationship shape indicates the parent table. In IDEF1X notation, the dot indicates the child table.

   Both connection points should appear red, and any primary keys in the parent table are added as foreign keys to the child table.

To edit the properties of a foreign key relationship

1. Double-click the relationship whose properties you want to edit.
2. In the Database Properties window, click the tab that contains the information you want to edit, and make your changes.

   The database model diagram is updated automatically. You can choose Edit > Undo to reverse the changes.

   Here is a brief description of each tab and the options it contains:

   Definition Associate columns in the parent and child tables and enter role names for foreign keys.

   Name Enter a Verb Phrase, Inverse Phrase, Physical Name, or Notes about the relationship.

   Miscellaneous Specify the Cardinality type , the Relationship type (Identifying or Non-identifying), and whether the relationship is Optional.

   Ref. Integrity Specify options that determine the effect on the child table when information in the parent table is updated or deleted.

Creating a project to collaborate on database design

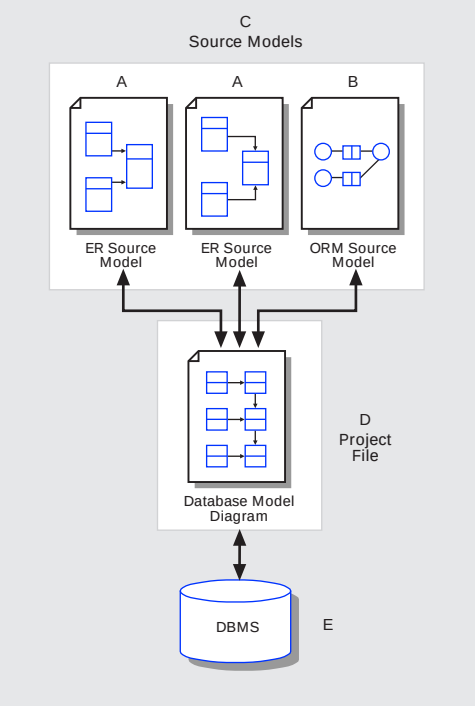
Microsoft Visio 2000 Enterprise Edition supports collaborative database design by generating or forward engineering a database schema from a project file. Projects can include one or more source models, which can translate into a collective logical or physical database model. From that database model, you generate or forward engineer the database schema.

A project is a Visio document (.vsd file) created with the Database Model Diagram template. Project files

- Identify all the source models that compose the project's database model.
- Identify other, non-Visio documents relating to the database model, such as project schedules or reports about the tables used in the model.
- Contain the collective database model from which you will generate your physical database schema.

Source models are separate database model diagram files you create in the ER Source Model or ORM Source Model template. You use source models to break a large database model into smaller, more manageable parts so that more than one person can work on the project at a time. You can also create and edit source models without including them in a project, but you cannot use source models to map changes to a database unless the source models are part of a project.

How a project and its source models interact



A ER Source Model documents represent logical database schemas.

B ORM Source Model documents represent conceptual database schemas.

C Source models must be included in a project before they can be used to generate a new database or update an existing one.

D Database Model Diagram documents can contain project information, including a collective model that represents the source models included in the project file.

E To migrate changes from a model to a database or to generate a new database, you must work in a Database Model Diagram document.

You can also add source models to a project by right-clicking the project name in the Project window and then choosing Add Existing Document, New ER Source Model, or New ORM Source Model from the shortcut menu.

Before you can map a source model to a physical database, you must first build the schema it represents as part of a project's logical or physical database model. Unlike conceptual models, which aren't concerned with how the database design will be implemented, logical and physical models assume the design will use a particular data model, such as relational or object-relational.

To create a project

1. Choose File > New > Database > Database Model Diagram to open a new database model diagram. Or, open an existing model that was created by using the Database Model Diagram template.
2. Choose Database > Project > Add Existing Document.
3. In the Add Document To Project dialog box, select the documents you want to add to the project, and then click Open.
4. *Optional* To create a new source model diagram and add it to the project, choose New ER Source Model or New ORM Source Model, enter a file name, and then click Save.
5. In the project file, choose File > Save and enter a name that identifies the project.
6. *Optional* Choose Database > View > Project to open the Project window.

To remove a source model from a project

- Right-click the source model you want to remove in the Project window, and then choose Remove Document from the shortcut menu.

  Alternatively, choose Database > Project > Remove Document, select the source model you want to remove, and then click OK.

Each project contains a collective model that represents all of the elements contained in all of the source models for that project. After building the collective model, you can connect to a DBMS.

To build a project's collective model

1 In the project file, choose Database > Project > Build.

> **NOTE** *If your project file already contains model elements, choosing Build migrates the elements in the model to one of the source models. If the project's collective model has been built previously, choosing Build updates the project's collective model with changes made in the source models.*

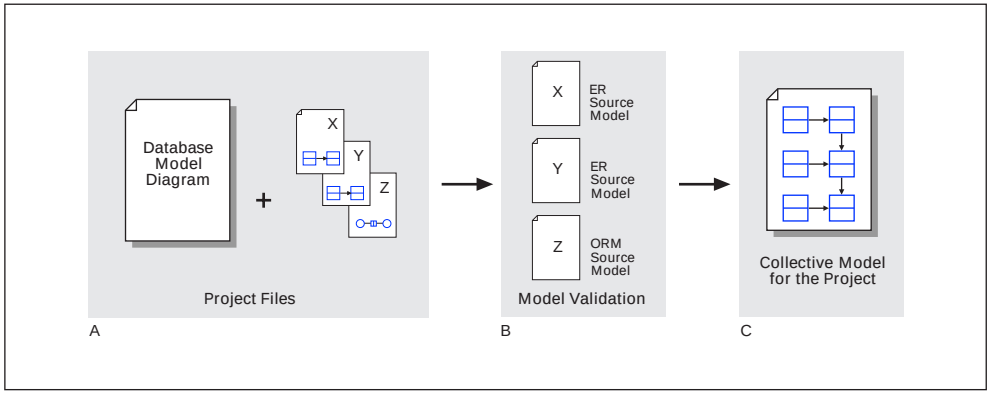
2 All source models are automatically checked for logical validity. If any of the source models contain errors, the project file cannot be built. Use the Output window to locate and resolve any errors.

3 Drag tables and views from the Tables window onto the diagram.

To map saved changes from a source model to the collective model

- In the project file, choose Database > Project > Build.

Any changes made to the source models in the project are reflected in the updated collective model.



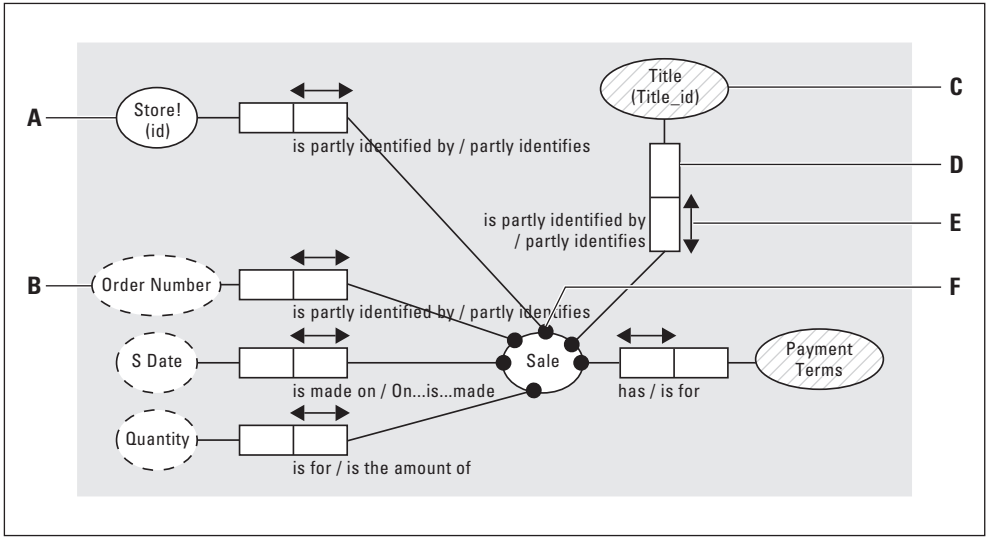
Building a project

When you choose Database > Project > Build from a project file containing a list of source models (**A**), the source models in a project are validated (**B**) and then merged into a collective logical model in the Database Model Diagram project file (**C**).

Business rules based database design

Not only does the Microsoft Visio 2000 Enterprise Edition database solution make it easy to generate and re-engineer databases, it also provides tools to help you communicate effectively with end users during the development process. To this end, the ORM Source Model template in the database solution supports database design and re-engineering through Object Role Modeling (ORM).

ORM notation



A Entity object types are drawn with solid lines.

B Value object types are drawn with dashed lines.

C External object types are drawn with shaded lines.

D Predicates appear as role boxes connected to object types.

E Uniqueness constraints appear as arrows drawn over role boxes, and indicate that every instance of data for that role must be unique.

F Mandatory constraints are drawn as a dot where the role connector attaches to an object type, and require that every instance of that object play the associated role.

By expressing a model in terms of natural concepts, such as objects and roles, ORM provides a conceptual approach to modeling. The ORM approach views the application domain as a collection of objects playing roles. To build your data model, you create an ORM model diagram, which the database solution can automatically translate into a fully normalized relational model. Unlike traditional entity relationship notations, ORM gives you the ability to capture business rules with its extensive constraints and to incorporate example populations to verify your design.

When you include your ORM model in a database model project, Enterprise Edition can map your ORM model to a logical or physical database model diagram in the project file. You can then use the entities and attributes of a logical or physical model to refine your design before you implement it in the target DBMS.

The ORM Source Model template contains all of the tools you need to create and refine ORM models. You can choose to work directly with shapes in the model diagram, or you can use the Business Rules window and the Fact Editor to create and modify facts and constraints. You can also use the Verbalizer window to review facts and constraints in a model stated in natural language.

To create an ORM model

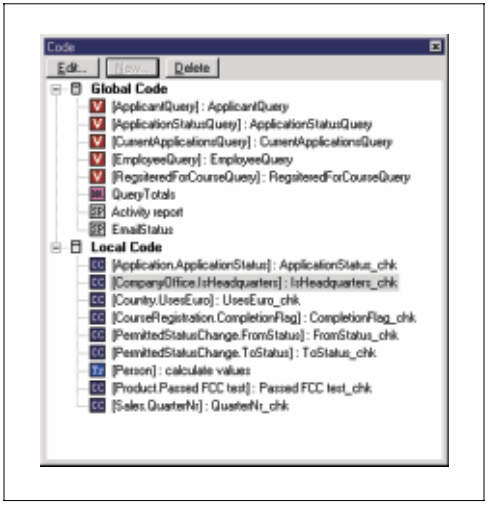
- Choose File > New > Database > ORM Source Model.

  The ORM Source stencil (ORM Source.vss) opens with a new drawing page.

Working with database code

Professional Edition and Enterprise Edition offer sophisticated handling of the code—such as views, check clauses, triggers, stored procedures, and raw DDL code—included in a database. You can choose to extract code when you reverse engineer a database, and you can add new code as you work in a model. And Enterprise Edition offers a Transfer command, so you can easily migrate platform-specific code from one DBMS to another.

The Code window



Stored procedures User-defined functions and other procedures that can be invoked with a CALL statement and are stored in an executable format in the database.

Functions Procedural code that returns a value.

Triggers Code associated with specific database tables that is invoked automatically whenever rows of the associated table are inserted, updated, or deleted.

Check clauses Code applied to a table or column that enforces constraints.

View Definitions Code, usually containing SELECT statements, that assigns the results of a query to a named, tablelike structure called a view.

Raw DDL Other code that does not fall into one of the above categories; for example, synonyms or package constructs in an Oracle database.

The Code window lists all of the code associated with a particular database driver. Local code is associated with a specific table or column in your model. Global code applies to the model as a whole.

How to work in the Code window

If you want to	Do this
Remove code from your model	Select an item in the list and then click Delete.
Display only global code	Right-click anywhere in the window and then choose Show Only Global Code.
Create a new stored procedure, function, view definition, or other DDL code	Click Global Code, click New, and then work in the Code Editor.
View an item in the Code Editor	Select an item in the list and then click Edit. Or double-click the item.

The Code Editor provides robust functionality for editing the code stored in your model. You can use the Code Editor to create new or edit existing code.

How to work in the Code Editor

If you want to	Do this
Automatically indent lines as you enter code to follow the scoping rules of SQL	Right-click in the code and then choose Properties. On the Language/Tabs tab, select Follow Language Scoping, and then click OK.
Assign keyboard shortcuts	Right-click in the code and then choose Properties. On the Keyboard tab, select a command, select a new key assignment, and then click OK.
Change spaces to tab characters	Select the code, right-click the selection, and then choose Tabify from the shortcut menu.
Change keyword colors in the code	Right-click in the code and then choose Properties. On the Color/Font tab, select an item, select a new foreground or background color, and then click OK.

To open code in the Code Editor

1. Choose Database > View > Code to open the Code window, if it is not already open.
2. Click a code item in the list, and then click Edit. Or double-click a code item in the list.
3. In the Code Editor, view and revise code on the following tabs:

   Body Enter and edit SQL statements. Use the toolbar buttons, or right-click in the code to see additional options.

   Properties Enter or revise the code component's name, select the type of code it represents, and create a mirror file for saving the code component externally.

   Notes Add code comments that will be generated in the DDL script for the model.
4. To set preferences for working in the Code Editor, click the Window Properties button (). Or right-click in the code, and then choose Properties from the shortcut menu.
5. In the Window Properties dialog box, select options from the various tabs, and then click OK.
6. Click OK to close the Code Editor.

To create a stored procedure, function, or other global DDL code

1. If the Code window is not already open, choose Database > View > Code.
2. Click Global Code, and then click New to open the Code Editor.
3. In the Code Editor, do the following:

   Body tab Enter SQL statements.

   Properties tab Type a name for the code item. Under Type, select Stored Procedure, Function, or Raw DDL.

   Notes tab *Optional* Enter comments for the code.
4. Click OK to close the Code Editor.

   The code is added to the Global Code list in the Code window.

Transferring code

The code you see in the Code window is platform specific, but with Enterprise Edition, you can transfer code from one target DBMS to another. You can create as many platform specific copies of your code as you need—all versions are stored with the model. As you work, you can view different code versions by changing the currently selected database driver. You can then customize the code as necessary for the intended platform by opening it in the Code Editor.

To transfer code to a different DBMS platform

1. Open the Database Model Diagram or ER Source Model template file that represents your database model diagram.
2. Choose Database > Code > Transfer.
3. In the Transfer dialog box, under Operation, select Move to transfer all the code to the new platform, or select Copy to transfer a copy of the code and leave the original implementation.
4. Under Source DBMS, select the database you reverse engineered. Under Destination DBMS, select the new platform for which you want to generate the code.
5. Click OK.

   When the transfer is complete, a message appears in the Info tab of the Output window.

Synchronizing code

With both Professional Edition and Enterprise Edition, you can create a mirror file for each piece of code included in your model that you can store in your version control software. And, in Enterprise Edition, you can edit the mirror files outside of the model, and then synchronize the model code with the mirror files. Mirror files are synchronized individually for maximum control.

To save code in a mirror file

1. Choose Database > View > Code to open the Code window, if it is not already open.
2. In the Code window, select the code you want to save, and then click Edit. Or double-click the code.
3. In the Code Editor, click the Properties tab.
4. For File, enter a path and file name, click Open, and then click OK to close the Code Editor.

Updating and generating databases

As you work in Professional Edition or Enterprise Edition, you can use the Refresh Model Wizard to update your model with changes that have been made to the database you reverse engineered.

In Enterprise Edition, from your completed model, you can use the Update Database Wizardto connect to the original database and modify it to reflect the changes in your model. Or, you can use the Generate Wizard to either generate a new database directly or create a DDL script that the DBMS will implement.

When you use the Update Database Wizard, Enterprise Edition performs a unique three-way comparison that tracks differences between the model, the original database schema, and the current database schema. When differences are discovered, you can choose how to resolve them.

To refresh a model

1. Choose Database > Model > Refresh to open the Refresh Model Wizard.
2. Follow the instructions in the wizard.

To update a database

1. Choose Database > Update to open the Update Database Wizard.
2. Follow the instructions in the wizard.

To generate a database schema

1. Choose Database > Generate to open the Generate Wizard.
2. Follow the instructions in the wizard.

NOTE *These commands are available only when you start a model using the Database Model Diagram template. Only the Refresh Model Wizard is available in Professional Edition.*

Use this wizard	To do this
The Refresh Model Wizard	Ensure that your model reflects the current state of the database from which it was extracted. This is helpful if the original database is being modified by several people.
The Update Database Wizard	Change the structure of your database to match the content of your model. You can update the database directly, or create a DDL script.
The Generate Wizard	Create a database schema for a particular DBMS using the information in your model. You can generate the new database directly, or create a DDL script.

Working with DDL scripts

Both the Update Database Wizard and the Generate Wizard include options for modifying a database directly or for creating a DDL script written in SQL code that can be implemented by the target DBMS. Not all DBMSs support direct modification through 32-bit ODBC drivers, and therefore may require that you work with DDL scripts. You should determine the requirements of your database before you choose either option. DDL scripts are also convenient if you want to manually review or edit the script before implementing it; they can be opened using any text editing program, such as Notepad. Additionally, creating a DDL script does not require the use of a 32-bit ODBC data source.

To create a DDL script

1. Choose Database > Generate to begin working in the Generate Wizard, or choose Database > Update to begin working in the Update Database Wizard.
2. On the first screen of the wizard, check Generate A Text File Of The DDL Script, enter a path and file name for the new script in the File Name box, and then click Next.
3. Follow the instructions on the remaining screens of the wizard.

When the wizard finishes, you are prompted to view the generated DDL script. Be sure to review the script carefully before you run it in your DBMS.

Validating and checking errors in a model

In Enterprise Edition, you can use the Error Check command to check the validity of your model at any time during the modeling process, and validation is automatically performed when you choose the Generate, Refresh Model, Update Database, or Build command.

During logical validation the database solution checks your model for adherence to generally accepted database design standards. For example, circular table relationships produce an error during logical validation. During physical validation, the database solution checks your database model for compliance with DBMS-specific requirements. For example, an Oracle DBMS allows only one column in a table to use the Long data type; if a table contains more than one column using this data type, validation will generate an error. It is possible to have a logically correct database model that contains physical errors, especially if you are reverse engineering a legacy database to a new DBMS.

To validate a database model

1. Open the drawing file that represents your model.
2. Choose Database > Model > Error Check.

To correct an error or warning

1. In the Output window, double-click the error or warning text.

   The structure is selected in the model diagram containing the error.
2. Right-click the error text in the Output window, then choose Get Help For Message from the shortcut menu.

   An explanation and solution for the error are displayed.
3. Make the necessary correction.
4. Repeat steps 1–3 for each error or warning in the Output window.

CHAPTER 4

Software design and documentation

Microsoft® Visio® 2000 Professional Edition and Enterprise Edition support the major object-oriented and data-oriented software modeling and design languages, including the Unified Modeling Language (UML). Professional Edition and Enterprise Edition make it easy for you to share your software designs and models and are excellent tools for team-based development.

Using the range of software solutions available in Professional Edition and Enterprise Edition, you can

- Create integrated system models using the UML. Reverse engineer information models from source code created in Microsoft Visual Studio® and generate code skeletons into C++, Microsoft Visual Basic®, or Java to speed up your development effort.
- Design and document software projects using object-oriented methodologies, such as Booch, Real-Time Object-Oriented Modeling (ROOM), and Rumbaugh.
- Show the procedural components of programs using structured charts, such as Nassi-Schneiderman charts.

In this chapter

Comparing software solutions in Professional Edition and Enterprise Edition

Microsoft Visio 2000 Professional Edition enables you to streamline your development efforts by quickly creating software model diagrams using a wide range of design languages, including the UML.

In addition, Enterprise Edition provides powerful functionality to jumpstart your development efforts once modeling is completed. Generate code skeletons directly from UML class diagrams. Enable other developers to easily access diagrams by exporting them to Microsoft Repository 2.0, and from there to the CASE tool of their choice.

The following table details the features provided by each edition.

Software solution features	Professional Edition	Enterprise Edition
Multiple software notation Create models using Booch, Rumbaugh, Schlaer-Mellor, Nassi-Schneiderman, ROOM, and other notations.	Yes	Yes
UML notation Create all UML 1.2 diagram types.	Yes	Yes
Reverse engineering Reverse engineer existing application code directly from Microsoft Visual Basic, Visual C++®, and Visual J++® to produce UML class diagrams.	Yes	Yes
Semantic error checking Identify and diagnose semantic errors in UML 1.2 diagrams.	No	Yes
Code generation Generate Visual Basic, C++, and Java code skeletons from UML class diagrams. Or generate IDL code for conversion to other scripting languages.	No	Yes
UML reports Generate customizable reports for UML static structure, deployment, and activity diagrams.	No	Yes
Microsoft Repository integration Import models from and export them to Microsoft Repository 2.0 to enable interaction with other tools such as PLATINUM ER*win* or Microsoft Visual Studio®.	No	Yes

Software modeling solutions

Each software modeling solution consists of SmartShapes® symbols programmed to behave according to the rules of the specific modeling methodology.

To open a software modeling solution

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition.
2. Choose File > New > Software, and then choose the solution you want to use.

The following table shows the software diagram types included in Professional Edition and Enterprise Edition.

Software solution and purpose
Booch OOD Supports the creation of object, class, timing, state, module, and process diagrams using Booch object-oriented design notation.
COM and OLE Supports the creation of COM (Component Object Model) objects and interfaces and system diagrams.
Data Flow Model Supports the creation of data flow diagrams using Gane-Sarson notation.
Fusion Supports the creation of diagram types included in the Fusion methodology.
Jackson Supports the creation of data and program structures using the Jackson software design method.
Jacobson Use Cases Supports the creation of use case, state transition, interaction, and other diagrams included in the Jacobson object-oriented software engineering method.

Software solution and purpose *(continued)*
Nassi-Schneiderman Supports the representation of sequence, selection, case, and repetition in program structure charts.
Program Structure Supports the creation of structural diagrams of programs and memory objects.
ROOM Supports the creation of Real-Time Object-Oriented Modeling (ROOM) diagrams that show the relationships among system components and system responses to events.
Rumbaugh OMT Supports the creation of object, dynamic, and functional diagrams using the Object Modeling Technique.
Shlaer-Mellor Supports the creation of class diagrams, class structure charts, dependency diagrams, and inheritance diagrams using Shlaer-Mellor notation.
SSADM Supports the creation of logical data structures, data flow diagrams, entity life histories, and other system analysis and design diagrams.
System Structure Supports the creation of diagrams that represent Microsoft Windows® and Macintosh operating systems and user interfaces
UML Supports the creation of integrated system models based on the Unified Modeling Language (version 1.2) diagram types.
Windows User Interface Supports users who need to develop, document, or prototype Microsoft Windows and Microsoft Office user interfaces.
Yourdon and Coad Supports the creation of object state, data flow, and other diagrams included in Yourdon and Coad object-oriented analysis and design notation.

Creating software models with the UML

This section provides a conceptual overview of the Visio approach to modeling in the UML and leads you through the basic steps of building a model from scratch.

The UML is used to specify, construct, visualize, and document the artifacts of a software-intensive system. The vocabulary of the UML is a notation—a set of shapes and symbols. Its semantics indicates the meaning of the shapes and the rules for their use.

The UML notation includes elements that support the creation of several diagram types. Each diagram provides a different view of a model of a software system.

The UML Model Diagram solution in Professional Edition and Enterprise Edition includes the following tools, shapes, and functionality.

Tool, shape, or functionality	Professional Edition	Enterprise Edition
UML Navigator Use the tree view to manage system models and navigate from one view to another.	Yes	Yes
Predefined shapes Use to represent all the elements in the UML notation that support the creation of all UML diagram types. The shapes are programmed to behave in ways that are consistent with the UML semantics.	Yes	Yes
UML Properties dialog boxes Add attributes, operations, and other properties to UML elements.	Yes	Yes
Reverse engineering Reverse engineer projects from Microsoft Visual Studio to generate UML static structure models.	Yes	Yes
Semantic error checking Identify and diagnose errors.	No	Yes
Microsoft Repository support Import and export information models, regardless of platform or tool.	No	Yes
Code generation Generate code skeletons from UML models to C++, Visual Basic, or Java.	No	Yes
Code checking utility Check syntax in models to identify potential compilation errors.	No	Yes
Report generation Create reports from UML diagrams that you can preview, print, and export as RTF files.	No	Yes

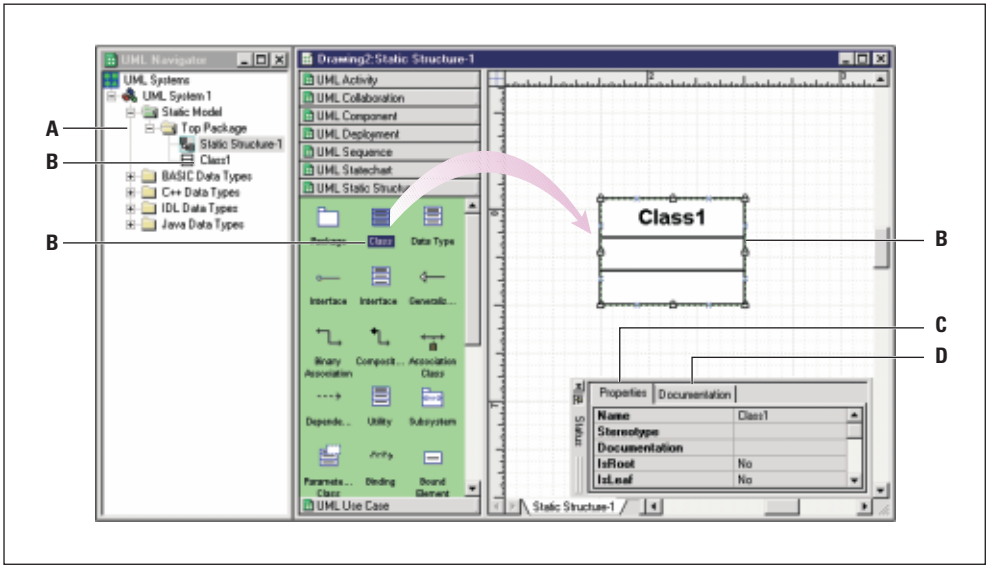
Using the UML solution interface

When you open the UML solution, you'll see the UML Navigator window, a Status window, UML diagram stencils, and the drawing page.

Understanding the Visio 2000 approach to modeling in the UML will help you work more efficiently.

- One UML drawing file represents a system. In the UML Model Diagram solution, the models you develop for a system are contained within one UML drawing file. System model files are saved with a .vsd extension.
- A package is the basic organizing element of a UML model. An element is owned by only one package, but you can include a reference to the element in other packages.
- All the models for a system appear in the same drawing file, and each model is visible in the tree view. One system can include many models.
- Each type of UML diagram presents a different view of a model. For example, use case diagrams show the system from a user's perspective, while class static structure diagrams translate user requirements into software classes and relationships.
- The tree view in the UML Navigator provides a comprehensive picture of the models of a system and of most elements in each model.

  Some elements, such as classes, use cases, and components, might exist in a model without appearing in a diagram.



The UML drawing file

A Your system model appears in a **tree view** in this section of the UML Navigator. As you add elements to the model, corresponding icons appear in the tree view.

B When you drag shapes from the available UML stencils onto the drawing page, many of the shapes also appear as icons in the tree view.

C **Property values** associated with UML elements appear on the Properties tab of the Status window.

D **Documentation-tagged values** associated with UML elements appear on or can be added to the Documentation tab of the Status window.

- Properties are features associated with UML model elements that become integral parts of those elements. For example, you can associate attributes, operations, and other properties with classes in class static structure diagrams.

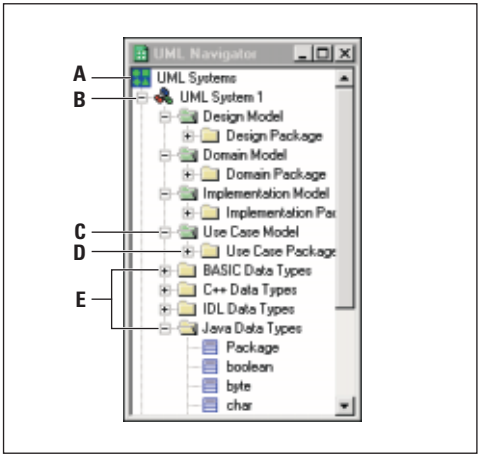
  For any UML element on a diagram, you have the option of showing or hiding specific properties.

  Right-click a shape and choose Shape Display Options to control which properties are displayed on a shape.

- **Enterprise Edition only** As you model a system using the UML solution in Enterprise Edition, a semantic error checker runs in the background to identify and diagnose errors. The semantic error checker locates the shapes or icons that represent elements that contain errors. Shapes turn red to indicate a semantic error.

  Error messages are displayed on the Errors tab in the Status window. Double-clicking the error selects both the icon in the tree view and the corresponding shape on the page.

Models in the tree view



A The Visio icon ( ) represents the UML Model Diagram file as a container for all the systems you want to model.

B The system icon ( ) represents the system you are currently modeling.

C The green folder icon ( ) represents one model of your system.

D The yellow folder icon ( ) represents the top package in the use case model. Packages are created automatically when you create a new model.

E These packages contain the common BASIC, C++, IDL, or Java data types.

Modeling a system using the UML solution

When you use the UML Model Diagram solution to model a system, you perform these iterative steps:

- Add a new model to the existing system.
- Start a new diagram within a model.
- Add UML elements to a model.
- Associate properties with UML elements.
- Diagnose and fix semantic errors.

Modeling a new system

To open the UML Model Diagram solution

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition.
2. Choose File > New > Software > UML Model Diagram.

By default, a new system includes the commonly used C++, BASIC, IDL, and Java data types. You can delete data types you don't use and add data types of your own.

NOTE *If you delete a predefined data type (C++, BASIC, Java, IDL) from the model, you will not be able to add it back into the current document. The best method for controlling the data types available in a model is to select the data types you want to use in the UML Options dialog box.*

Adding a new model to an existing system

When you open the UML Model Diagram template, your system already includes one model called the Static Model. You can add new models that offer different perspectives of your system, and delete models you no longer need.

To add a new model

1. Open the UML Model Diagram file that represents your system.
2. Choose UML > Models.
3. In the UML Models dialog box, click New.
4. Select the new package in the list, and then click Properties.
5. In the UML Model Properties dialog box, enter or choose values for the properties you want. Click OK, and then click OK again.

To edit an existing model

1. Open the UML Model Diagram file that represents your system.
2. Choose UML > Models.
3. In the UML Models dialog box, select the model to edit, and then click Properties.
4. In the UML Model Properties dialog box, enter or choose values for the properties you want to change. Click OK, and then click OK again.

To delete a model

- Right-click the model's icon in the tree view, and then choose delete.

> **NOTE** *A system must include at least one model, so the UML solution will prevent you from deleting the last available model.*

Starting a new diagram within a model

The UML solution is designed to help you create UML diagrams in the proper relationship to one another. For example, you can create a statechart or activity diagram only in relation to a specific class or use case.

To start a new diagram

1. Open the UML Model Diagram file that represents your system.
2. In the tree view, right-click the icon representing the package, class, or use case in which you want to place the new diagram.
3. Choose New from the shortcut menu, and then choose the type of diagram you want to create.

Adding UML elements to a model

Elements, such as classes, use cases, and components, might exist in a model without appearing in a diagram.

When you add an element to a diagram by dragging a shape from a stencil onto the drawing page, the element is automatically added to the tree view. However, when you add an element directly to the tree view, the element does *not* appear in a diagram. You must also drag the icon from the tree view and drop it onto a drawing page.

Similarly, if you delete a shape from a diagram, that shape is not automatically deleted from the tree view.

In addition, you can add different views of the same element to different diagrams by dragging the icon representing the element onto different drawing pages.

To add a new element to a model

1. Open the UML Model Diagram file that represents your system.
2. In the tree view, right-click the package or class in which you want to create a new element, and then choose New from the shortcut menu.
3. Choose the kind of element you want to create.

To add a new element to a diagram

1. In the tree view, double-click the icon that represents the diagram to which you want to add a new element.

   The appropriate stencil and drawing page appear.
2. Drag the shape representing the element you want to add to a diagram from the stencil and drop it onto the drawing page.

   When you drop classifier shapes, such as Class, Use Case, and Component shapes, onto the drawing page, an icon is automatically added to the tree view for each new element.

To add a view of an existing element to a diagram

- Drag the icon from the tree view onto the diagram to which you want to add it.

Reverse engineering source code into the UML

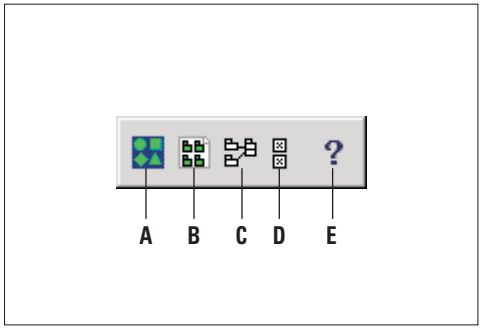
If you develop projects in Microsoft Visual Basic, Visual C++, or Visual J++, you can use the UML solution in Professional Edition or Enterprise Edition to reverse engineer your projects' class definitions and then generate UML static structure models.

The reverse engineering process automatically generates a model from your source code in the tree view of the UML Navigator. You can then drag icons from the tree view onto a drawing page to create static structure diagrams, and you can access the properties of UML elements by double-clicking an icon in the tree view or a shape on the drawing page.

NOTE *This solution supports reverse engineering only for version 6.0 of Visual C++, Visual J++, and Visual Basic. Service Pack 3.0 for Microsoft Visual Studio must be installed for the Visio UML Add-In to function properly.*

To reverse engineer a project, you must first customize your development tool (Visual C++, Visual Basic, or Visual J++) with the Visio UML Add-In, and then open the project that contains the code you want to reverse engineer. The following procedures use Visual Basic as an example.

The installation of Professional Edition or Enterprise Edition includes the DLL files used to customize Visual C++ 6.0, Visual J++ 6.0, and Visual Basic 6.0.



Visio UML Add-In toolbar

When you customize Visual C++, Visual J++, and Visual Basic using the Visio UML Add-In, this toolbar for reverse engineering to the UML solution becomes available. Commands are also added to the Tools menu. You can locate the commands by choosing Tools > Visio UML Solution.

A **Open Visio button** Click to start Visio 2000 and choose the solution you want to open.

B **New Visio UML Document button** Click to open the UML Model Diagram solution.

C **Reverse Engineer UML Model button** Click to reverse engineer the source code for a specific project, open the UML Model Diagram solution, and display the results as icons in the tree view.

D **Visio UML Options button (Visual C++ only)** Click to set options for including or excluding MFC classes, ATL classes, or standard Include files.

E **Visio UML Help button** Click to open the Visio UML help topics on reverse engineering source code.

To customize Microsoft Visual Basic with the Visio UML Add-In

1. In Visual Basic, choose Add-Ins > Add-In Manager.
2. In the Add-In Manager dialog box, select Visio UML Add-In. For Load Behavior, check Loaded/Unloaded and Load On Startup, and then click OK.

To reverse engineer source code in Visual Basic

1. Customize Visual Basic, and then open the project that contains the source code you want to reverse engineer.
2. In Visual Basic, click the Reverse Engineer UML Model button () on the Visio UML Add-In toolbar.

   The Visio UML Model Diagram solution opens with a blank static structure diagram drawing page and a tree view in the UML Navigator populated with icons that reflect the class definitions in the source code.
3. In the UML Model Diagram solution, drag icons from the tree view onto the drawing page to create a static structure diagram.

Support language constructs

Language	Constructs supported
Visual C++	• Classes • User-defined types • Enumerated types • Member functions • Member variables • Method parameters
Visual Basic	• Classes, modules, and forms • Functions and subroutines • Functions and subroutine parameters • Constants • Member variables • Properties • Events
Visual J++	• Packages • Classes • Interfaces • Class and interface methods • Class attributes • Method parameters

The UML diagrams in a typical development process

The UML notation, and the UML solution in Professional Edition and Enterprise Edition, support the creation of models without recommending any particular development process.

For the purpose of showing the diagrams in a meaningful context, the following sections organize the UML diagram types into models that roughly correspond to the phases a development process might follow.

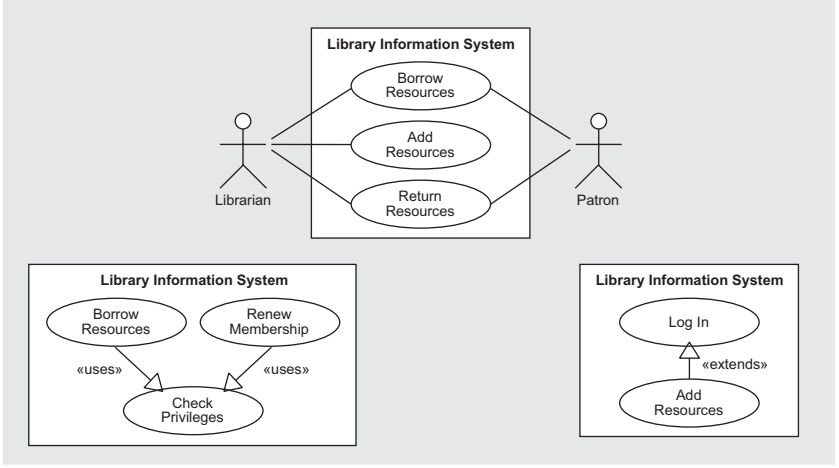
To create a new UML diagram

1. Open the UML Model Diagram file that represents your system.
2. In the tree view, right-click the icon representing the elements that you want to diagram, and then choose New > [diagram type] from the shortcut menu.

   For conceptual, package, and class diagrams, choose New > Static Structure Diagram.

Use case model phase

Use cases are narrative process descriptions that you create early in a development cycle. They describe the interactions between external actors and the system, and make the system requirements and the terminology used in the domain area more understandable.



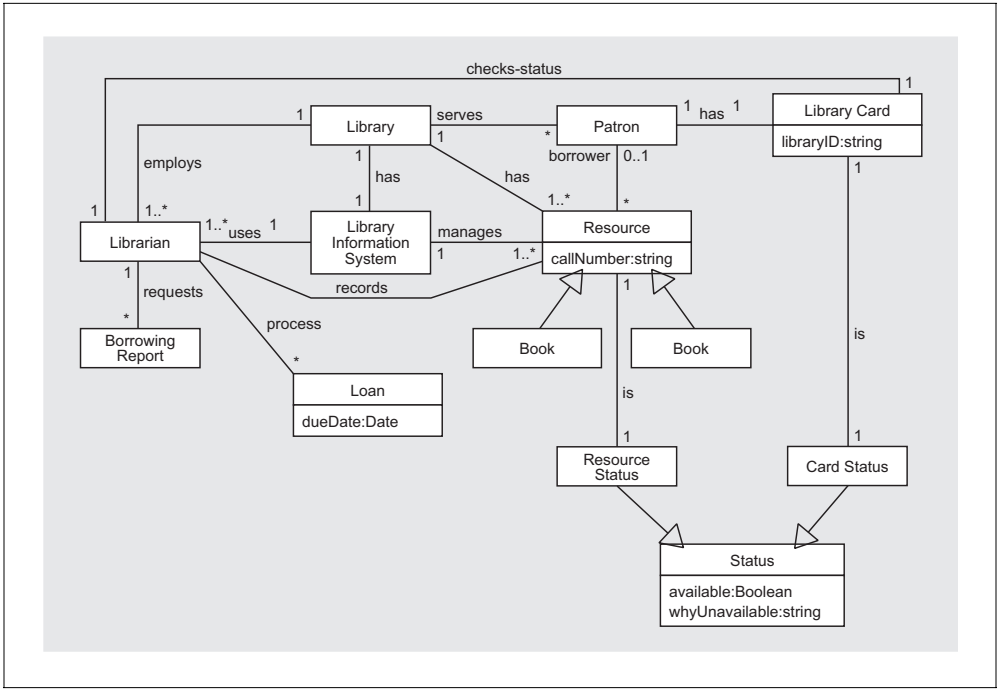
Create use case diagrams to describe real-world activities and motivations. Creating a use case diagram involves establishing a system boundary for a set of use cases and defining the lines of communication between a particular actor and a use case.

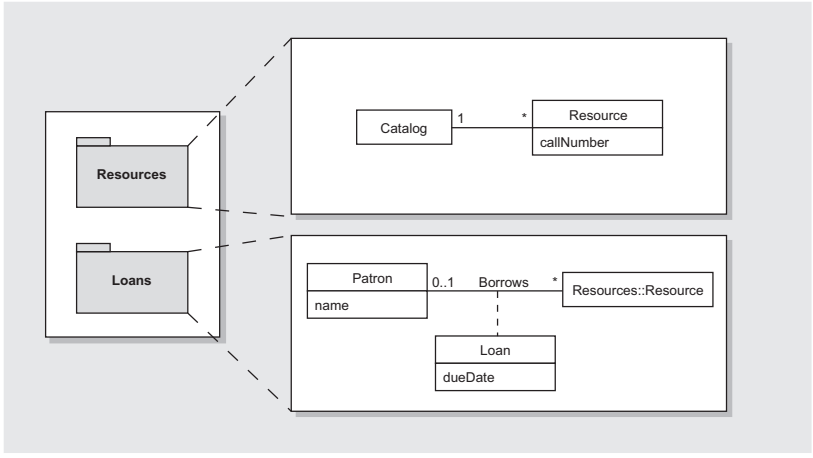
Domain model phase

Like the use case phase, the domain model phase is an analysis phase in which you're still thinking more about objects and relationships in the real world than about programming concepts.

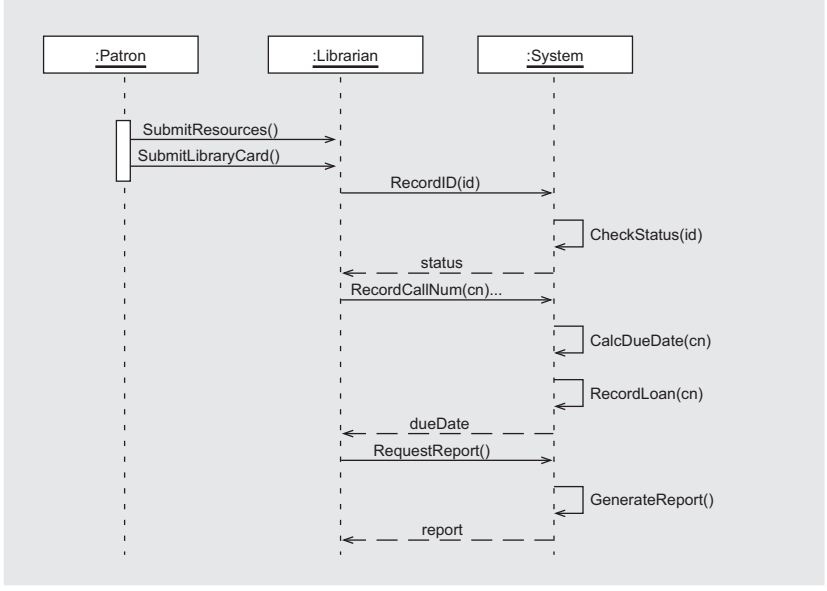
NOTE *The diagrams in the following sections, which illustrate a library information system, originally appeared in object-oriented analysis and design training materials written by Craig Larman for ObjectSpace (www.objectspace.com). The activity, component, and deployment diagrams originally appeared in the OMG Unified Modeling Language Specification.*

Use a conceptual diagram—a type of static structure diagram—to represent concepts from the real world and the relationships among them. The conceptual model focuses on relationships and attributes rather than methods, and helps you understand the terminology in the domain.





As your understanding of the problem domain increases, your conceptual model becomes more complicated. You can use packages—the basic organizing elements of UML system models—to divide your model into smaller, more manageable subsets, or to define system architecture.



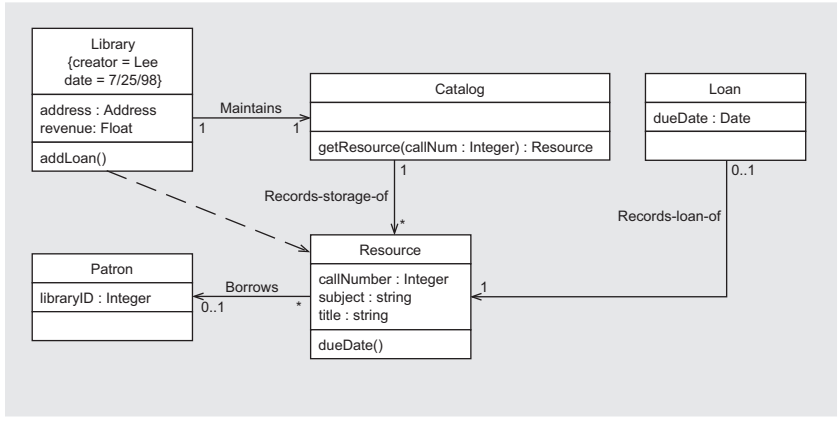
Use a type of interaction diagram called a sequence diagram to show the actors or objects participating in an interaction, and the events they generate, arranged in a time sequence. Often, a sequence diagram shows the events that result from a particular instance of a use case.

Design model phase

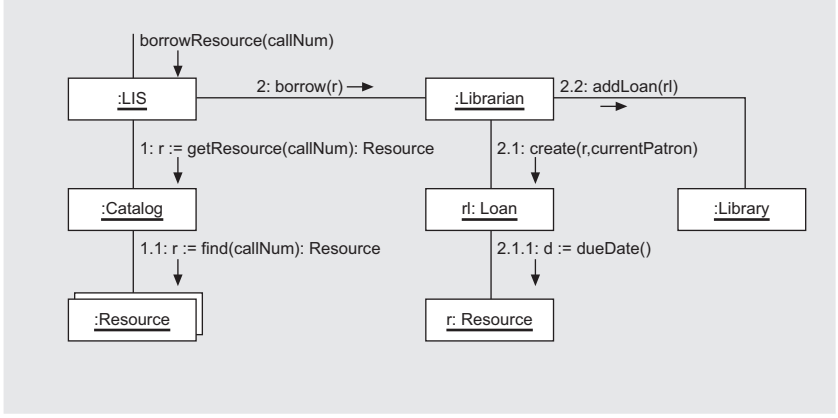
In the design model phase, you apply the knowledge gathered in the earlier phases and come up with a programming solution.

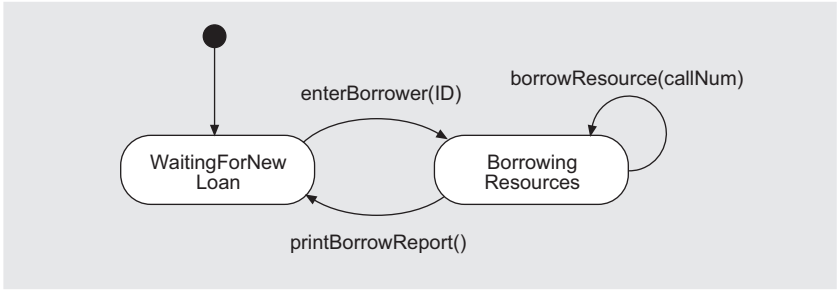
Use collaboration diagrams to determine how objects will communicate and class diagrams to define the classes you will implement in the software. To understand the life cycle of an object, create a statechart or activity diagram in relation to a particular class, concept, or use case.

Class diagrams are static structure diagrams that decompose a software system into its parts. The parts are classes that represent fully defined software entities. In addition to attributes and associations, a class diagram also specifies operations, methods, interfaces, and dependencies.

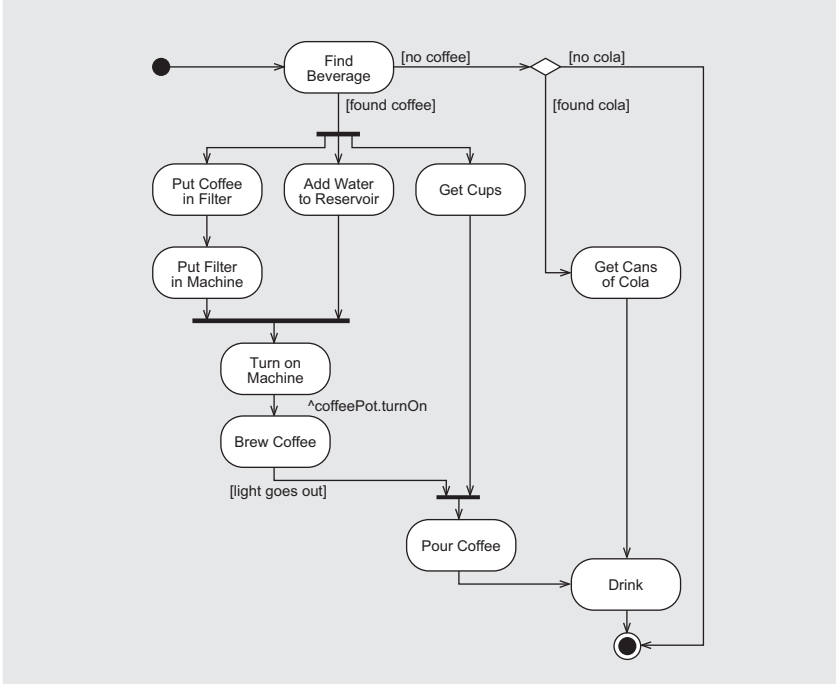


Use a collaboration diagram to show how a group of objects collaborates with one another for one system event defined by one use case. A collaboration diagram shows relationships among object roles related in a particular context—a collaboration—and an interaction, which is the set of messages exchanged among the objects to achieve an operation or result.





Create a statechart diagram to represent a state machine, or a graph of states and transitions that describes the response of an object to outside stimuli. By documenting events and transitions for a single class or use case, a statechart diagram shows the sequence of states a single object goes through during its lifetime.

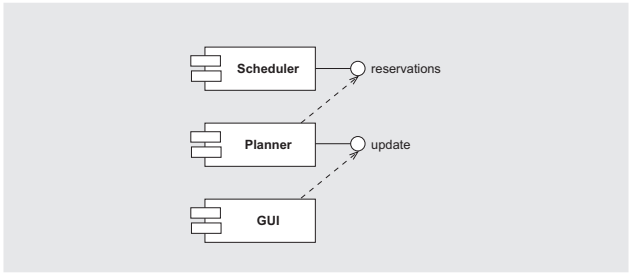


An activity diagram is a special case of a statechart diagram in which all of the states are action states and the transitions are triggered by the completion of actions in the source state. Related to a specific class or use case, an activity diagram describes the internal behavior of a method.

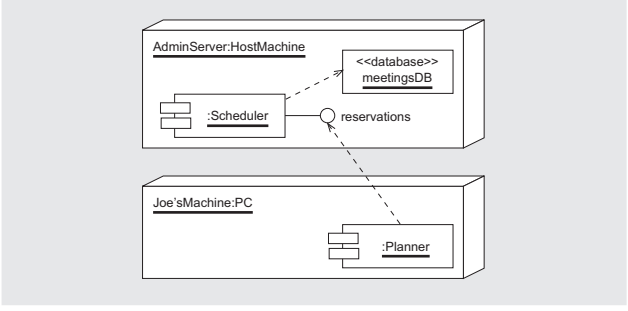
Implementation model phase

The implementation model phase focuses on the physical and component structures of the development environment.

Use component diagrams to show the structure of the code itself. A component diagram consists of components—such as source code files, binary code files, executable files, or dynamic-link libraries (DLLs)—connected by dependencies. Use a component diagram to partition a system into cohesive components.



Use deployment diagrams to show the structure of the run-time system. From a deployment diagram, you can understand how the hardware and software elements that make up an application will be configured and deployed. Deployment diagrams consist of nodes, components, and the relationships between them.



Diagnosing and fixing semantic errors

As you create a model in Microsoft Visio 2000 Enterprise Edition, any relationships you have defined that violate UML notation rules are logged. In addition, Enterprise Edition identifies any syntax errors that might be allowable in UML notation but are likely to cause errors in code generated in the selected language.

To diagnose and fix an error

1. Open the UML Model Diagram file that represents your system.
2. In the Status window, click the Errors tab to read a description of the error to diagnose the problem.
3. Double-click an error to locate the icon or shape that represents the UML element you need to fix.

   In the tree view, the selected element turns gray. If the element is represented in a diagram, the UML solution displays that diagram and the shape has red error markings.

To turn semantic error checking off

- Choose UML > Options and click the UML Add-on tab.

To locate and diagnose language-specific errors

- Choose UML > Code > Check.

  The Code tab in the Status window identifies target language-specific syntax errors based on the language you have selected for generating code.

Creating reports from a UML model

At any point during the development process, you can create, print, preview, and export a report from a UML diagram to share information with team members.

The UML solution offers preformatted reports for static structure, activity, and deployment diagrams.

To create a report from a UML diagram

1. Choose UML > Report.
2. In the UML Report dialog box, customize the formatting options and data definitions for each report using the Headers/Pagination tab and the Detail tab.

To preview a report before you print or export it

1. Choose UML > Report.
2. In the UML Report dialog box, click the Preview button.

To export a report as a Rich Text Format (RTF) file

1. Choose UML > Report.
2. In the UML Report dialog box, click Export.
3. In the Export To RTF dialog box, type a file name and path and then click Save.

Generating code skeletons from UML models

As you create UML model diagrams for a system, you can get a head start on your development efforts by generating code skeletons into Visual Basic, C++, or Java for any diagram in the model that contains class definitions.

When you generate code, you follow these general steps:

1. Set language and project location, and then set preferences for the parts of code to be generated and code formatting.
2. Validate the UML model against the target language to check for keywords and element properties that might cause compilation errors in the target language.
3. Select the desired classes and then generate the code skeleton.
4. Open the resulting code skeleton files in the target language using the development tool of your choice.

Setting code generation preferences

You set preferences for generated code using the Code Generation Preferences dialog box. The dialog box contains a tree view that includes a view of global default preferences for general element types in the model, and an element-specific view of the current model.

When you select an option in the tree view, the options in the right side of the Code Generation Preferences dialog box change based on the current selection.

Default templates for code formatting are provided, and you can edit these templates or add new templates to meet your needs.

The UML solution provides code templates with formatting for coding conventions. You have the option of using the existing templates, editing the templates, or adding new templates to meet your specific coding needs.

To set preferences for code generation

1. Open the UML system that includes the class definition data for code generation, and choose UML > Code > Preferences.
2. For Language, select the target language from the list.
3. For Project Directory, type or browse to specify the project directory for the generated code files.
4. To set default code formatting preferences, under Options, expand the Global Default Preferences folder.

   Select a folder for an option to display its preference settings.

   Edit the settings for each option type and then click OK when you are finished.
5. To set specific preferences that override default settings for individual elements, under Options, expand the Element Preferences folder.

   Select the element for which you want to set preferences that override the default settings, and edit the settings for the element.
6. Click OK when you are finished.

Checking a UML model for language-specific code errors

The UML solution can automatically check for syntax and semantic errors specific to the UML. However, some of the keywords and element properties that are acceptable in the UML might not be valid in the target language. You can check for language-specific errors that will prevent your generated code from compiling.

To check a UML model for language-specific syntax errors

1. Open the UML system that includes the class definition data for code generation, and choose UML > Code > Check.
2. In the Status window, click the Code tab.
3. To locate an element associated with a code error message, double-click the error message on the Code tab.

   The UML solution indicates the element by selecting its icon in the tree view and, if a view of the element exists, by displaying a diagram and selecting its shape.

Generating code skeletons

When you generate the code, the following types of files are created

- **For Visual Basic** .cls, .bas, and .frm files
- **For C++** .cpp and .h files
- **For Java** .java files

You can open the resulting code skeleton files in the target language using the development tool of your choice.

To generate code skeletons from a UML model

1. Open the UML system that includes the class definition data for code generation, and choose UML > Code > Generate.
2. Type or browse to specify the project directory for the generated code files.
3. Select the target language.
4. Check the classes that you want to be included in the generated code.
5. Click OK.

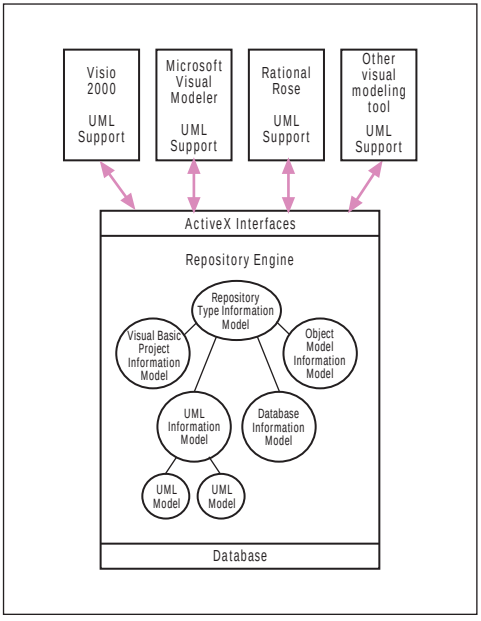
Storing and retrieving models: working with Microsoft Repository

All of the components you need to store and retrieve models in Microsoft Repository 2.0 are installed and registered when you install Microsoft Visio 2000 Enterprise Edition.

When software components are stored in Microsoft Repository as information models, developers can access and use the components regardless of which tool the components were created in or on which platform they run.

The Microsoft Repository Type Information Model supports the creation of UML information models only for static structure data. Therefore, only the static structure components of models can be imported from or exported to Microsoft Repository.

NOTE *When you import a model, it appears in the form of icons in the UML Navigator tree view.*



The first time you export UML static structure data, Enterprise Edition creates the UML information model in Microsoft Repository that defines the objects UML models can use. Through Microsoft Repository, you can exchange UML models with any other visual modeling program that also supports the UML information model.

When you export, property data you have added to the UML elements is exported along with the elements themselves.

To import a model from Microsoft Repository

1. Choose File > New > Software > UML Model Diagram.
2. Choose UML > Repository > Import. In the Connect To MS Repository dialog box, select the connection method.

   Locate the Microsoft Repository database that includes the model you want to import.

   If necessary, type your user name and password, and then click OK to continue.
3. In the Repository Import dialog box, under Models, select the name of the system model you want to import, and then click OK.

   The model is imported, and icons for its elements are added to the existing system in the tree view.

To export data to Microsoft Repository

1. Open the UML system that includes the static structure data you want to export.
2. Choose UML > Repository > Export to create the new database.

   In the Connect To MS Repository dialog box, select the connection method and then locate the model you want to export.

   If necessary, type your user name and password, and then click OK to continue.
3. In the Repository Export dialog box, under Models, select the name of the system model you want to export, or type a new model name, and then click OK.

   If you export a model with the same name as an existing model, you overwrite the existing model.

NOTE *When you choose the Export command, the UML solution's semantic error checking automatically checks for errors that will cause problems in the static structure data you export. Errors are listed on the Errors tab in the Status window.*

CHAPTER 5

Business process design and documentation

Microsoft® Visio® 2000 Professional Edition and Enterprise Edition include a wide range of tools for quickly and thoroughly designing and documenting your business processes.

With Professional Edition or Enterprise Edition, you can

- Use a variety of flowchart types, such as cross-functional flowcharts, to analyze and communicate information about how your business organizations and processes relate.
- Create timelines to plan projects and diagram processes, including tracking tasks, milestones, dependencies, and resource information.
- Create data flow diagrams using Gane-Sarson notation to clarify how data is generated and flows through your business processes.
- Generate Web site maps to help you plan, manage, and troubleshoot your Web site.

In this chapter

Using flowcharts to analyze your business

Using Microsoft Visio 2000 Professional Edition or Enterprise Edition, you can diagram complex business processes to make them easy for others to understand. Flowcharts are visual representations of a process. Managers often create flowcharts to understand and communicate how a process works and how it can be improved.

Professional Edition and Enterprise Edition provide a number of flowchart diagram types, as shown in the following table.

Flowchart diagram types in Professional Edition and Enterprise Edition

Flowchart type	Purpose
Audit Diagram	Use to create auditing flowchart diagrams for accounting, financial management, fiscal information tracking, money management, decision flowcharts, and financial inventories.
Basic Flowchart	Use for flowcharts, top-down drawings, information tracking drawings, process planning drawings, and structure prediction diagrams.
Cause-And-Effect Diagram	Use for drawings that illustrate problem-solving.
Cross-Functional Flowchart	Use to create drawings that illustrate the relationships between process and the organization.
Data Flow Diagram	Use for process- or data-oriented models, data flowcharts, data process diagrams, structured analysis diagrams, and information flow diagrams.
IDEF0 Diagram	Use IDEF0 process charting models to create hierarchical diagrams for model configuration management, needs and benefits analyses, requirements definitions, and continuous improvement models.
SDL Diagram	Use the Specification and Description Language (SDL) to create object-oriented diagrams for communication and telecommunication systems and networks.
TQM Diagram	Create Total Quality Management (TQM) drawings for business process re-engineering, total quality management, continuous improvement, and quality solutions.
Work Flow Diagram	Represent information flow, automation of business processes, business process reengineering, accounting, management, and human resources tasks in industry, business, and manufacturing.

To draw a flowchart using the connector tool

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition. In the Welcome To Microsoft Visio dialog box, click OK.
2. Choose File > New > Flowchart > Basic Flowchart.
3. Click the connector tool () on the Standard toolbar.
4. Drag a shape from the Basic Flowchart Shapes stencil onto the drawing page.
5. Drag a second shape onto the drawing page.

   The shapes connect.
6. Drag shapes to build the complete flowchart. Each new shape you drop connects to the selected shape.

Working with large flowcharts

Professional Edition and Enterprise Edition provide several useful methods for working with multiple-page flowcharts. For example, you can

- Use shape numbering to cross-reference explanatory notes, or to indicate the sequence of steps in a large business process.
- Use off-page reference shapes to navigate pages in multiple-page flowcharts, or to link to an existing page in your drawing.

To number shapes in your flowchart

1. With a flowchart open, choose Tools > Macros > Visio Extras > Number Shapes.
2. On the General tab in the Number Shapes dialog box, choose the options you want.
3. Click the Advanced tab and choose the placement and numbering sequence options you want, and then click OK.

To connect to a new or existing page in your flowchart using the Off-Page Reference shape

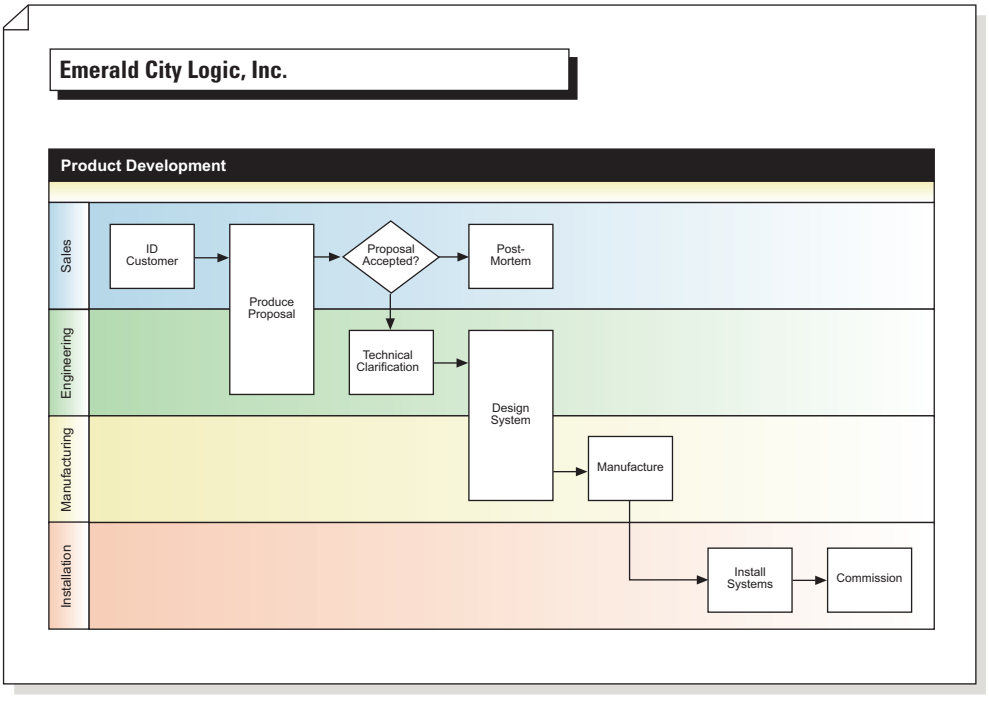
1. From the Basic Flowchart Shapes stencil, drag the Off-Page Reference shape onto the drawing page.
2. In the Off-Page Reference dialog box, choose the options you want, and then click OK.

Creating horizontal or vertical cross-functional flowcharts

In Professional Edition and Enterprise Edition, you can create either horizontal or vertical cross-functional flowcharts depending upon which layout best conveys your information.

Cross-functional flowchart

This cross-functional flowchart uses horizontal functional bands to illustrate how processes flow through and affect departments.



To create a horizontal or vertical cross-functional flowchart

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition. In the Welcome To Microsoft Visio dialog box, click OK.
2. Choose File > New > Flowchart > Cross-Functional Flowchart to open the Cross-Functional Flowchart solution.
3. Choose an orientation for the bands in your flowchart, the number of bands (up to five), and whether you want to add a title bar to the top of the bands, and then click OK.
4. Click the title bar to select it and then type a name for the process the drawing represents. Click each band label to select it and then type a name for the band.
5. Drag a flowchart shape from the Basic Flowchart Shapes stencil to the appropriate location on a band or across bands to represent the first step in the process.
6. Click the connector tool () on the Standard toolbar. With the first shape still selected, drag a second shape onto the drawing page.
7. Drag shapes to build the complete flowchart. Each new shape you drop connects to the selected shape.

Importing flowchart data from other applications

You can use Professional Edition or Enterprise Edition to automatically create a flowchart from information in a text file or in Microsoft Excel format. You can either import this information from a program that supports flowchart data export, or you can create a new text file (.txt) or Excel file (.xls) using the Import Flowchart Data Wizard, and then create your flowchart from that data.

To import flowchart data

1. Choose Tools > Macros > Flowchart > Import Flowchart Data Wizard.
2. Follow the instructions on the wizard screens to
   - Create a flowchart from imported data in a text (.txt) or Excel (.xls) file.
   - Create a new text file or Excel file that you can use to create a flowchart automatically.

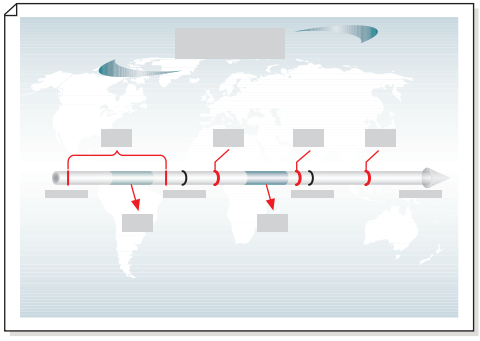
Creating a timeline for a project overview

You can easily add a color scheme to your diagram. Choose Tools > Macros > Visio Extras > Color Schemes, and then choose the color scheme you want, or create a new one.

If your job involves planning projects and processes, you can use Microsoft Visio 2000 Professional Edition or Enterprise Edition diagrams to help you track project milestones, task intervals, and overall project duration.

Using timeline diagrams, you can show tasks, milestones, and resource information, such as who is responsible for which tasks.

You can easily distribute your timeline to co-workers or import it into another application. For example, you could import it into Microsoft PowerPoint® to use in a presentation.



You can use timelines to communicate major project milestones

To create a timeline

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition. In the Welcome To Microsoft Visio dialog box, click OK.
2. Choose File > New > Project Schedule > Timeline.
3. From the Timeline Shapes stencil, drag a Timeline shape onto the drawing page.
4. In the Configure Timeline dialog box, do the following:
   - Choose the timeline beginning and end date, the time scale, and the date and time scale formatting.
   - To automatically update the dates on your marker, milestone, and interval shapes when you move them, check Automatically Update Dates When Markers Are Moved.
5. To add a right or left arrowhead to your timeline, right-click the Timeline shape, and then choose either Show Right Arrowhead or Show Left Arrowhead.

To add a milestone

1. From the Timeline Shapes stencil, drag a Milestone shape onto your timeline.
2. In the Configure Milestone dialog box, choose the milestone date and the date format you want, and then click OK.

To add an interval

1. From the Timeline Shapes stencil, drag an Interval shape onto your timeline.
2. In the Configure Interval dialog box, choose the marker beginning date, end date, and date format.

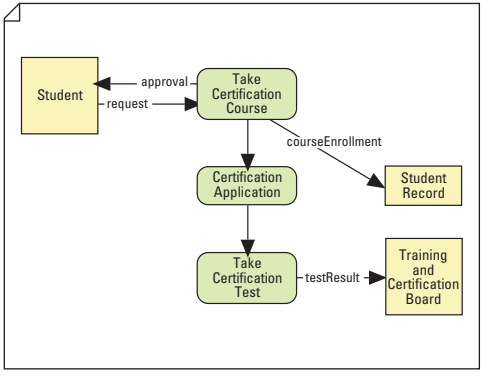
   The Visio program positions the marker on the timeline using the marker beginning and end dates you chose.

To revise a timeline

1. Right-click the timeline, and then choose Configure Timeline from the shortcut menu.
2. In the Configure Timeline dialog box, revise the timeline data, and then click OK.

Working with data flow model diagrams

A data flow model diagram is a tool for functional analysis that uses Gane-Sarson notation to model the flow of information through a system or program. For example, e-commerce professionals can use Microsoft Visio 2000 Professional Edition or Enterprise Edition to draw process and data flow model diagrams that clarify how customers will navigate an e-commerce site and how that site can make purchasing quick, easy, secure, and profitable.



Use a top-down design strategy to create your data flow model diagrams. Begin by creating the top-level processes, then decompose each process into subprocesses for more detail.

The Data Flow Model Diagram solution includes the following features to facilitate your creation of data flow diagrams:

- A stencil containing all the data flow shapes necessary for modeling data flows using Gane-Sarson notation
- The DFD Navigator that displays a tree view of the entire data flow model, including elements that have not been added to any diagram
- The Status window, for automatic semantic error checking
- Separate detail pages for each process you decompose
- Automatic importing of data flows to ensure equivalence of boundaries between top-level and detail pages

To create a data flow model diagram

1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition. In the Welcome To Microsoft Visio dialog box, click OK.
2. Choose File > New > Software > Data Flow Model Diagram.
3. Create the top-level detail page for the diagram by dragging shapes from the Gane-Sarson stencil onto the drawing page.

   As you add the shapes to the page, icons that represent the shapes appear in the DFD Navigator.
4. Identify the elements in the model by double-clicking the shapes and adding text.
5. Connect the shapes to each other using the Data Flow connector shape on the Gane-Sarson stencil.
6. Add a detail page for each process. Your detail pages can include subprocesses that require additional detail pages.
7. Continue adding detail pages for each process until you have described the entire data flow model system in sufficient detail.

Using the DFD Navigator

The DFD Navigator provides a hierarchical tree view of the data flow model you create. This tree view displays all the elements you have included in your data flow model, whether or not you have included the element on a data flow diagram page.

You can add shapes to a diagram by dragging icons onto the drawing page from the tree view or from the stencil. When you drag a shape from the stencil onto the drawing page, the shape is automatically added to the tree view as an icon. However, when you add an element to the tree view, it is not automatically added to the diagram.

Similarly, if you delete a shape from a diagram, the corresponding icon is not automatically deleted from the tree view.

Automatic error checking

When you use the semantic error checking option, as you add elements to the data flow diagram, any elements with semantic or syntactical errors appear red, and the descriptions of these errors or warnings are displayed on the Errors tab in the Status window.

To set options for a data flow model, including turning the semantic error checking on or off

- Choose DFD > Options, check or select the options you want, and then click OK.

Adding detail pages and subprocesses

Detail pages represent the different levels in the process your data flow model diagram represents. Once you've created the top level processes of your data flow model, you can use detail pages and subprocesses to decompose each process to the level of detail you want.

To add a detail page

- Right-click a process shape on the page, and then choose New Detail Page.

To navigate between levels of a data flow model diagram

- Select a process shape, and then choose DFD > Go To Detail Page.

Importing data flows to ensure equivalence

When you add a detail page, any shapes required to ensure equivalence at boundaries to the detail page are automatically added. Equivalence at boundaries requires that the data flow elements affecting a process on a top-level page also be included on the detail page for that process, to balance the model.

If you then add one or more data flows to a process on a higher level page, and that process already has a detail page, you can import the data flow(s) onto the detail page to ensure equivalence at boundaries for that detail page.

To import a data flow to balance a detail page

1. From the detail page, choose DFD > Import Data Flow.
2. Check each data flow you want to import, and then click OK.

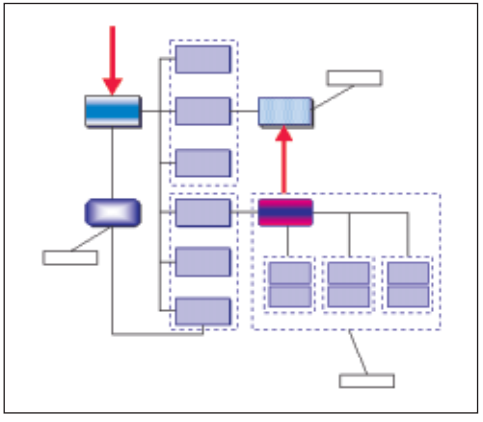
Planning Web sites and troubleshooting links

The Internet Diagram solution includes the Conceptual Web Site and Web Site Map templates.

Using the Internet Diagram solution in Microsoft Visio 2000 Professional Edition or Enterprise Edition, you can

- Create high-level, conceptual diagrams of new Web sites to visualize the sites' purpose, content, and overall organization.
- Generate maps of existing Web sites to analyze the sites' organization and classify their content.
- Troubleshoot broken links and the errors that caused them using site maps and log files.

Planning a new Web site



Begin in the Conceptual Web Site template by dragging a Main Page shape onto the drawing page, and then work your way down from there, dragging more shapes onto the drawing page and connecting them as you go to create navigation patterns.

To create a diagram of a new Web site

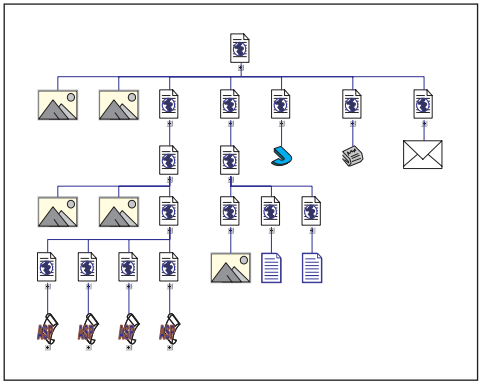
1. Start Microsoft Visio 2000 Professional Edition or Enterprise Edition. In the Welcome To Microsoft Visio dialog box, click OK.
2. In the Choose Drawing Type dialog box, click Internet Diagram.
3. In the Drawing Type box, double-click Conceptual Web Site.
4. Click the connector tool ( ) on the Standard toolbar, and then drag the Main Page shape onto the drawing page from the Conceptual Web Site Shapes stencil.
5. With the Main Page shape selected, drag another shape onto the drawing page. The shapes are automatically connected.

To annotate a shape with callouts

1. Drag a callout shape from the Callouts stencil onto the drawing page.
2. Connect the shapes by dragging the endpoint ( ) of the callout shape to a connection point ( ) on the shape it is annotating.

Mapping an existing site

When you generate a map for your site using the Internet Diagram solution, it creates a shape for each link in your Web site that includes information about the link, such as the location and link type. The solution also adds hyperlinks to shapes so you can jump directly from the shape to the link the shape represents.



The home page shape is positioned at the top of your site map. The shapes connected to it represent the links on the home page. The same model holds throughout the map.

You can also specify what you want to include in your site map—the maximum number of levels, the maximum number of links, and the kinds of links (for example, HTML pages, ASP pages, image files, and so on).

To map an entire Web site

1. Choose File > New > Internet Diagram > Web Site Map.
2. In the Generate Site Map dialog box, do one of the following:
   - If the site is on an HTTP server, in the Address box type the address for the Web site you want to document.
   - If the site is on a network server or local hard disk, click Browse, navigate to the file you want at the root of your site map, and then click Open.
3. Under Include, select Entire Web Site.
4. Enter the maximum number of levels you want to search or accept the default. Enter the maximum number of links you want to search or accept the default. Click Options, and on the Links tab, choose the type of links you want to include in your site map.
5. Click OK to begin generating the site map.

   The Internet Diagram solution examines the HTML code for a page and searches for attributes, such as HREF, USEMAP, and SRC. It examines each attribute, and then displays the links that match your specifications on the Links tab.

   If the solution finds broken links on your site, it writes that information to a log file. Click OK to view the log file immediately, or click Cancel to return to your site map. You can view the log file at a later time by choosing Web > View Log File.

NOTE *When you're mapping a site, it's a good idea to limit the search to improve performance and clarity. For example, you might not want all the links to images to appear in your site map.*

Using your site map to troubleshoot your Web site

You can use your site map as a diagnostic tool to locate and repair broken links on your Web site.

When you use the Web Site Map template to generate your site map, any errors it encounters when browsing for a link (for example, Failed To Load) are written to a log file, and your diagram displays a shape with an X through it to indicate the link is broken.

After you repair the link on your Web site, you can either turn off the error marking for a shape or regenerate a portion of the site map for all the links on a specific page.

Your Web site and site map are not dynamically linked, so fixing the broken links on your Web site does not update your site map and vice versa. You must fix broken links on your Web site and regenerate your site map separately.

To remove error marking from a shape

1. Right-click the shape, and then choose Properties from the shortcut menu.
2. In the Error box, choose None, and then click OK.

To regenerate a part of your site map

1. Right-click the shape that represents the HTML or ASP page whose links you want to map again, and then choose Collapse [Address].
2. Right-click the shape again, and then choose Expand [Address] to regenerate that portion of the site map.