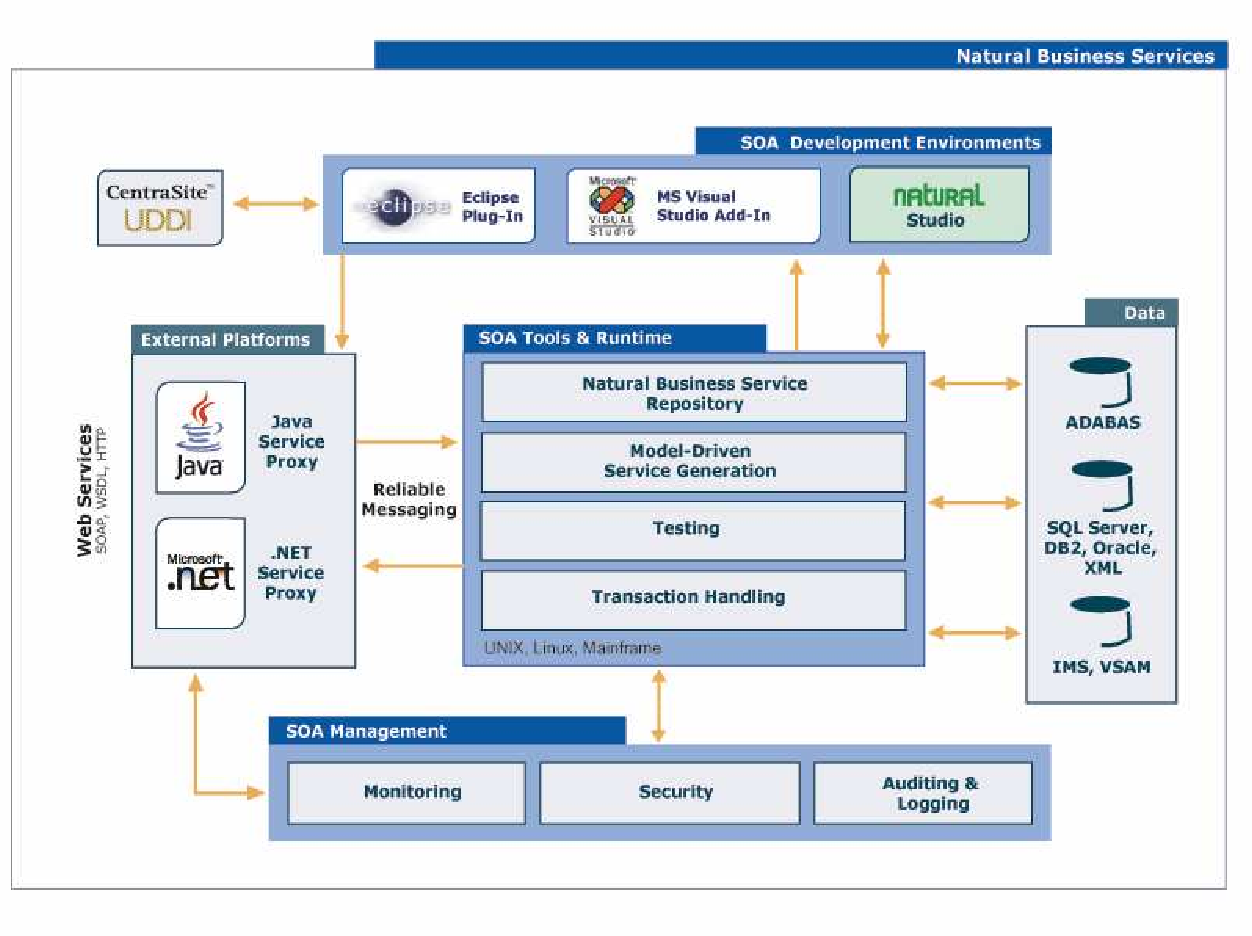
Architecture of Natural Business Services

Using Natural Business Services, you can create all the components of a business service, including Natural object subprograms that perform maintenance and browse functions and GUI dialogs or web pages that communicate with the object subprograms. Communication between server and client components of an application is performed by a combination of EntireX and Entire Net-Work (or EntireX configured to use TCP/IP), as well as Natural Business Services middleware components: the business service client proxy and Natural Business Services servers. The middleware components encapsulate calls to EntireX on the client and server. The following diagram shows the architecture of character-based Natural applications and business service components:



This section describes these components according to the platforms on which the components run.

- Server Components
- Client Components

Server Components

This section describes the server components for Natural Business Services. The following topics are covered:

- Required for Development
- Required at Runtime
- System Functions

Required for Development

The following table lists the components required for development purposes:

Component	Description
Natural subprograms	Subprograms written in Natural that do not contain user interface code (for example, WRITE, DISPLAY, PRINT, INPUT, and REINPUT statements) or navigation code (for example, PF-key processing). They can be existing Natural subprograms or they can be wizard-generated in Natural for Windows. Existing subprograms can be wrapped together so one server subprogram accesses more than one subprogram. The Business Service wizard can wrap the subprograms it generates, as well as use Natural Construct models internally to generate subprograms that perform maintenance and browse functions on the server. The wizard chooses the appropriate model based on criteria the user has selected. These models are: Object-Browse-Subp, Object-Maint-Subp, Object-Browse-Select-Subp, and Object-Generic-Subp. **Notes:** 1. The Object-Browse-Select-Subp model has the same type of functionality as the Browse-Select model, but is designed for a client/server environment where only *n* rows are processed at a time. 2. The Object-Generic-Subp generates a business service that uses more than one pre-existing subprogram. The same set of business objects can be accessed from character-based Natural applications, client/server applications, and web applications. This ensures that the integrity of business data is preserved, independent of the presentation layer, and existing code can be preserved.
Character user interface (optional; only used at sites that access the business service from a 3270 client)	Non-distributed Natural applications created with Natural Construct accessing subprograms directly (for example, subprograms generated by the Object-Maint-Dialog model).

Component	Description
Subprogram proxy	Link between a specific subprogram and the Natural Business Services dispatch server. The subprogram proxy: ● Provides a common interface so that the dispatch server can pass the same set of parameters to any subprogram proxy ● Issues a CALLNAT to the subprogram ● Converts the parameter data of the subprogram into a format that can be transmitted between the client and server ● Supports optimization of the data passed through the network so that only input parameters must be sent to the dispatch server and only output parameters must be returned to the client ● Validates the format and length of the data received from the client ● Supports debugging features to help uncover inconsistencies between the data sent by the client and the data expected by the subprogram proxy ● Populates the repository with the domain name, business service name, version, and default methods during generation. The default methods are determined by the subprogram for which the proxy was created. For example, an object maintenance subprogram has default methods such as Add, Delete, and Next and wrapped Natural subprograms have their own methods in the specifications. The subprogram proxy adds these methods to the repository.

Required at Runtime

The following table lists the components required for runtime purposes:

Component	Description
Business Service Administration subsystem	Server subsystem that allows system administrators, application administrators, and developers to set up and manage system and application environments. **Note:** Although this subsystem also provides access to the Business Service repository, we recommend that you use the Eclipse or Natural plug-in to access the repository. Only system environment options will be discussed from the server perspective.

Component	Description
EntireX	Runtime component that transfers messages between Windows or the web server and the Natural environment. EntireX can be configured to use either native TCP/IP or Entire Net-Work as the transport layer. EntireX performs the following runtime functions: ● Encrypt and decrypt data (set in the Broker attribute file) ● Compress and decompress data (set in the Broker attribute file) ● Translate data (handled automatically and has defaults you can customize) **Notes:** 1. As this component is separate, it can be used without Natural Business Services and may already be installed. It is a required component for the Natural Business Services system environment. 2. You do not require EntireX to create or test business services. It is used to define security or to balance loads in a runtime environment.
Natural Business Services dispatch server	Server that provides a common interface and EntireX services for Natural subprograms in the application. The main functions of the Natural Business Services dispatch server are to: ● Receive requests from the client through EntireX ● Optionally decompress and/or decrypt and translate the request message from the client's character set (ASCII) to the server's character set (either ASCII or EBCDIC) ● Check security to ensure that the client is permitted to issue the request ● Determine the name of the subprogram proxy that handles the request ● Issue a CALLNAT to the subprogram proxy, passing the received message as a parameter string ● Optionally compress and/or encrypt the message to be returned ● Send information received from the subprogram proxy back to the client application **Note:** For more information, see System Functions.
Dispatch server data	Information that is defined and maintained in the Business Service Administration subsystem and accessed by Natural Business Services dispatch servers anywhere on the network using EntireX.

Component	Description
Security server	Server used to check security settings in the Business Service Administration subsystem to determine whether to grant client requests. This stand-alone server operates independently of any one Natural Business Services dispatch server, which allows the server to centrally process the requests of several dispatch servers located on nodes throughout the network.
Attach server	Server that determines which dispatcher to use and whether other dispatchers are required. If other dispatchers are required, the attach server will start them.
Business Service repository	Directory structure containing the business service metadata, such as domains, subprogram proxies, descriptions, methods, method descriptions, as well as security access to these services and methods.

System Functions

All Natural Business Services dispatch servers defined in the Business Service Administration subsystem have access to the following common system functions:

Function	Description
Return debugging information	Ensures that all requested debugging information is generated into the source area. Debugging information is requested by setting a trace option in the subprogram proxy. The debugging information is stored as a source member that can be examined or used to initiate the request locally on the server, thereby removing the client and the network from the test.
Handle errors	Captures runtime errors and returns the errors to the client. If possible, this function also restarts the server that ended with the runtime error.
Handle messages	Returns a message string based on a message number and substitution values. This function accepts and updates the data used by the Natural Business Services dispatch server to return the message.

Client Components

The client components for Natural Business Services are:

- Natural for Windows
- Business Service Consumers

Natural for Windows

The Natural for Windows components on the client are:

Component	Description
Program generation plug-in	Interface into Natural Construct.

Component	Description
Business Service plug-in/add-in	Interface into the Business Service repository. This interface also provides a wizard to generate business services.
Natural Development Server (NDV)	Middleware component used to connect the client to a Natural server. EntireX is not required in a Natural for Windows environment.

Component	Description
Business Service repository explorer	Tree view of the business repository. Using the repository explorer, you can: ● Perform the following tasks using the context menu for the Business Services node: ○ Search for and find specific services across domains ○ View the security audit window to determine if anything unusual is happening (the security audit window can also be accessed by selecting **Business Services** from the **Tools** menu) ● Perform the following tasks using the context menu for the Domains node: ○ Invoke the Business Service wizard to create a new business service for the domain ○ Refresh the list of available business services in the domain ○ Search the business services using different search techniques ○ Deploy all the services in the domain to a specified environment (excluding the Natural modules) ○ Implement security for the services in the domain ○ Audit activities pertaining to the domain ○ Delete the domain and all services in the domain ○ Edit the domain to modify its description or steplib chain definition ● Perform the following tasks using the context menu for a business service: ○ Test the service ○ Deploy the service to another environment ○ Audit the service to determine who changed it and when ○ Regenerate the service proxy; this is required if the service interface (PDAs) changes ○ View the subprograms used by the service and, optionally, open a subprogram in the Natural editor ○ Delete the service ○ Edit the service to modify descriptions, add or delete methods, or change subprogram proxies

Component	Description
Business Service wizard	Wizard used to create business services from existing Natural subprograms and/or generate new subprograms. Internally, the wizard generates Natural subprogram proxies and Natural Construct objects and populates the Business Service repository.

Business Service Consumers

You can create business services in the Visual Studio and Eclipse development environments, as well as consume the services. Use the Natural Business Services Visual Studio add-in or Eclipse plug-in to create classes and Web services from business services.

The business service consumer components on the client are:

Component	Description
Business Service add-in or plug-in	Link to Natural Business Services from Visual Studio or Eclipse. Using the add-in or plug-in, you can configure the business service connections, search for business services, and invoke the client proxy and/or Web Service wizard to generate classes and/or Web services (.NET or C# in Visual Studio or Java in Eclipse).
Business Service menu	Menu used to perform the following tasks: ● Open the Business Service repository explorer ● Search for services in the Business Service repository **Note:** The connection used for this service is from the Visual Studio configuration settings, not the connection selected in the repository explorer. In Eclipse, these features are available through the context menus in the repository explorer. ● Modify the configuration settings ● Regenerate all classes in the current project that were created by the Business Service wizard
Business Service repository explorer	Tree view of the business repository. Using the repository explorer, you can: ● View the current business services and domains ● Search services across domains to find particular services ● Invoke wizards to create a client proxy or Web service
Client Class wizard	Wizard used to generate client proxies and/or Web services (depending on the context) that are specific to a particular business service.

Component	Description
Web Service wizard	Wizard used to generate Web services that use IIS (Internet Information Server) and a .NET runtime component. This wizard is invoked from the Web Services node in the explorer window. After generating the Web service, open the context menu for the Web service and select **Test** to submit SOAP messages and test these services.
Web Application wizard	Wizard used to generate a web application based on previously generated Web services. This wizard is invoked from the Web Applications node in the explorer window. During generation, the wizard sets up folders for the web application and creates the support files. After generating the web application, you can open the Web Applications node and select the context menu for Pages to generate a web page or select the context menu for Menu to generate a menu for the web application.
Configuration utility	Utility used to define configuration settings for Web services and applications. **Note:** Web applications use the connection specified in the Web.config file in the Web Services directory in inetpubs.