Making the Transition to
SOA-based Application Development

From Natural Construct to Natural Business Services

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For years, Software AG has provided the premier platform for application development with Natural. Now, we recognize that the changing face of application development provides new opportunities for Natural developers.

As we look at the history of application development, it began with the use of available technologies to build applications that automate core business functions. Subsequently, as software companies began selling packages to perform common functions, developers shifted from the “build” mentality to the “buy” mentality. Now, as more organizations move toward a Service-Oriented Architecture (SOA), we are facing a new trend: composite application development. Natural developers, with their ability to think separately about presentation versus business logic versus data access, have the key skills for SOA-based composite application development. And Natural Business Services helps Natural developers to capitalize on those skills, offering the ideal tools for developing SOA applications. Whether you’re building new applications or extending the core functionality of your existing applications, Natural Business Services facilitates the transition to a Service-Oriented Architecture.
INTRODUCTION

In this white paper, we will focus specifically on how Natural Construct users can transition to Natural Business Services to achieve the advantages of SOA-based application development. The paper highlights:

- A method for converting existing Natural Construct-generated applications to services based on subprograms;
- Two options for generating services from Natural Construct using Natural Business Services:
  - Integrating Natural Construct applications with .NET/java applications by re-using Natural business logic from Java or .NET applications;
  - Exposing Natural Construct applications as Web services to reuse Natural business logic from Web applications (for example, based on Java or .NET);
- How to work with Natural Construct models developed by customers under Natural Business Services;
- How to customize models as provided with Natural Construct and support for user exits;
- How to test services developed by Natural Construct Models; and
- How to provide governance for applications generated with Natural Construct.

WHAT IS NATURAL BUSINESS SERVICES?
A SUMMARY FOR NATURAL CONSTRUCT USERS.

Natural Business Services allows you to bring Natural into a Service-Oriented Architecture. Its basic premise is providing the ability to create a “business service” – a logical definition of one or more subprograms that provides some business functionality. The subprograms that make up a service can be handwritten or generated by Natural Construct.

These business services have a service interface (via Natural parameters) and have business methods (for example, AddOrder, UpdateCustomer, etc.).

Figure 1: Natural Business Services Architecture
Business services can then be integrated with a variety of modern technologies and programming languages (for example, Java, .NET and Web services).

Natural Business Services was developed to deliver immediate benefits, especially for current Natural Construct users, who can take advantage of:
- Similar terms and expressions (domains, security, models, generation parameters);
- Use of the well-known, robust Natural Construct generation engine;
- A user interface with the same look and feel as the Natural Construct user interface;
- The ability to reuse the interface (subprograms) generated with Natural Construct without any change;
- A tool for converting traditional Natural Construct applications to SOA applications (Browse to Object-Browse).

You can create business services easily using either a Natural for Windows or Eclipse plug-in (Figure 2). The Natural for Windows plug-in is recommended for Microsoft technology users and the Eclipse plug-in for users of Eclipse as their development platform. Creating business services uses the power of Natural Construct to generate data access and business layer subprograms.

You can easily refine generated code using Natural Construct models directly from Natural Studio (Figure 3), which allows you to start with a high-level specification and refine it as needed.
MAKING THE TRANSITION TO SOA-BASED APPLICATION DEVELOPMENT

Figure 3: Refine generated code using Natural Construct models directly from Natural Studio

You can also use a new Natural Construct model that allows you to create a service by wrapping one or more existing subprograms. This model combines the parameter data areas of the selected subprograms into one unified service interface and also allows you to provide detailed service methods, including the order of calling existing subprograms.

CONVERTING EXISTING NATURAL CONSTRUCT APPLICATIONS TO SERVICE-READY COMPONENTS

If you have existing Natural Construct applications that use the Browse model, you can convert the programs generated with this model so that they are service ready. Because the Browse model generates a program with a mix of user interface, database and business logic, it must be converted to an Object Browse series of models before you use Natural Business Services to generate services.

The Transform Browse model is a new model, available in both Natural Construct and the Natural Business Services plug-ins, that allows you to transform a program generated by the Browse model into the Object-Browse series of models.

This means that an Object-Browse-Subp is generated to handle the business and data logic. In addition, an Object Browse Dialog and Object Browse Dialog Driver are generated to handle the legacy (character-driven) user interface.

The Transform Browse model handles all of the user exit code generated in the Browse models and moves it to the correct new model. It will also convert the user exit code so that it will work correctly in the new models.

The Transform Browse model is a new model available in both Natural Construct and the Natural Business Services plug-ins...
Figure 4 shows a screen capture of the Transform Browse Wizard from Natural for Windows.

The Transform Browse model is just like any other Natural Construct model and can be customized to suit your needs...

The Transform Browse model is just like any other Natural Construct model and can be customized to suit your needs as special conversion circumstances arise (for example, certain patterns of user exit code are present and require specific replacements in the new model formats).

OPTIONS FOR GENERATING SERVICES FROM NATURAL CONSTRUCT USING NATURAL BUSINESS SERVICES

Integrating Natural Construct Applications with Java/.NET applications

If you have developed applications in Java or .NET and you need to integrate these applications with your existing Natural Construct applications, Natural Business Services is a good choice. Natural Business Services helps you open your Natural Construct applications and integrate them into an SOA. If your Natural Construct application is based on Natural Subprograms, you can easily generate the services directly from existing Natural Construct applications. If the application is not based on Natural Subprograms (generated using Natural Construct object models), you can use a different conversion model (as described in previous section).
The first step is defining an existing subprogram as a Natural Business Service. Defining a subprogram as a Natural Business Service means:

- Providing a subprogram a meaningful business name, e.g., assigning “ASUB001Z” the name “Update Customer Record;”
- Adding documentation for the business service;
- Assigning the business service to a domain (where services of the same kind can be grouped together);
- Optionally defining owner/security for the business service;
- Optionally testing the business service.

The subprograms do not necessarily have to have been generated by Natural Construct (such as the object* models), but can be subprograms written by hand (provided they have no user interface elements).

Figure 5 shows how easy it is to create a Natural business service using the Business Service Wizard (here in Eclipse). Natural Business Services automatically checks the subprograms to ensure they are service ready, e.g., a subprogram containing an Input statement will not be accepted.

![Create a Natural Business Service using the Business Service Wizard](image)

The next step is to generate a Java class that can then communicate directly with the Natural business service you have defined in the previous step. The new service repository explorer helps you locate and select existing services in the service repository. After you have selected the service, continue with the Create Class menu item (Figure 6).
Then, all you need to do is supply a Java project and package (or use the default package) and you’ll have a Java class that allows you to invoke your business service easily.

You’ll have access to all the fields in the subprograms, and service methods will be generated depending on which model was originally used to generate the subprogram. For example, the code in Figure 7 shows how to call a service based on the Object Maint Subp model via a generated Java class:

```
CustomerClass cust = new CustomerClass();
// We want to retrieve customer ID &
cust.getObjectData().setCustomerNumber(5);
try {
    BusinessServiceResult bar = cust.next();
} catch (Exception e) {
    System.out.println(e); // Error handling.
}
// Print out the customer business name.
System.out.println(cust.getObjectData().getBusinessName());
```

You can also use the Natural Business Services add-in in Visual Studio .NET to accomplish the exact same task and generate C# or VB.NET code (Figure 8).
Generating Web Services from Natural Construct Applications

Another option is to generate Web services from Natural Construct applications – a simple matter of using Natural Business Services to expose Natural business functions as Web services. Using the provided plug-in (in Eclipse or in Visual Studio.NET), all you need to do is choose a single Natural Construct-generated subprogram representing the business function – the Wizard will do the rest of the work (Figure 9).
You can use an internal or external server to host your Web service. Internal servers require no additional products or configurations and provide you with a working Web service in a matter of seconds. Or you can point to an existing pre-configured Web server and generate your services to a more static environment.

After you create the Web service, the WSDL (Web Service Definition Language) is immediately available for you to start integrating your services as Web services into other Web applications, whether they are Java, .NET or other Web-based applications.

**HOW TO WORK WITH CUSTOMER-DEVELOPED NATURAL CONSTRUCT MODELS**

If you have developed Natural Construct applications using your own defined Natural Construct model, you can reuse the models to generate new subprograms when using the Business Service Wizard. To do this, you define a special parameter data area that contains the fields you need to populate the specifications of your Natural Construct model. An XML configuration file is then provided for you to enter which custom Natural Construct models should be available and the layout of the parameter data area (Figure 10).

![Figure 10: XML configuration file](image)

Then, in the Business Service Wizard, you can select from the Custom models that you’ve defined in the drop-down list and enter the necessary specifications for that model (Figure 11). The final step is to provide the service identifier, which is used to derive new names for the generated subprograms.
Customizing Models

With Natural Construct, you can customize the supplied models to add functionality specific to your applications. Natural Business Services supports this, provided you do not make changes to the parameters of the Natural Construct runtime (CD* modules).

You can introduce new parameters or change how the code is generated, and Natural Business Services will still generate services the same way, including the advanced generation of classes that understand the underlying pattern of these models.

You can even introduce new methods used by the Object Maint Subp model and then have Natural Business Services generate these methods automatically when a business service is created. This is done by making changes to another Natural Construct model, the Sub-program Proxy model, which is responsible for registering new services when they are generated. Like all Natural Construct models, its source is fully available and customizable.

When you customize a Natural Construct model, changes included with new versions must be merged with the changes you have made. Natural Construct provides tools to make this easier, including a code-frame compare and source compare utility.

Figure 11: Select custom models using the Business Service Wizard

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Support for User Exits

Like Natural Construct, Natural Business Services fully supports user exits. Thus, any modules generated by Natural Construct for use within Natural Business Service can also be modified using user exits. This includes user exits that add parameters to the generated code; for example, when service clients – such as Web services or Java classes – are generated, the extra parameters will be available.

If you do change or add parameters to service modules, you must regenerate the service in either Natural for Windows or Eclipse. This works in basically the same manner as Natural Construct generation, and you never need to worry about losing code you add to user exit locations. If you use a user exit to add or modify code without changing the parameters of the subprograms, then the new functionality is instantly available.

TESTING SERVICES DEVELOPED BY NATURAL CONSTRUCT MODELS

If you are accustomed to testing Natural Construct-generated subprograms using the Driver model supplied with Natural Construct, you’ll find that Natural Business Services makes testing even easier. Any service can immediately be tested in either Natural for Windows or Eclipse via our dynamic testing utility. All you need to do is locate your service in the repository and choose the Test menu item. The service and its subprograms are then analyzed and the parameters for the service are displayed in the test dialog window.

Figure 12: Test dialog window
As you can see in Figure 12, each field in the data area is represented in the tree on the left, and detailed information, including the current value of the field, is shown on the right.

You can also save these tests in Eclipse and run them in the future using Eclipse’s built in unit test framework (JUnit). When saving a test for future use, you can supply input data for specific fields and validation checks to determine if output values are correct when executing the test (Figure 13).

Note: You can use the testing facilities of Natural Business Services for any service subprograms, not just the ones developed by Natural Construct.

SOA GOVERNANCE FOR NATURAL CONSTRUCT APPLICATIONS AND SERVICES

Governance is an important part of SOA, enabling you to document and control services in your enterprise and manage their lifecycles. With Natural Business Services, you can document your services and the meta-data in CentraSite™ by using the CentraSite Wizard provided via the Eclipse plug-in (Figure 14). Here you can define which services and which types of meta-data you’d like to store in CentraSite (for more information see http://www.centrasite.org).
Once the data has been added to CentraSite, you can use CentraSite via the CentraSite Eclipse plug-in...
For example, in Figure 16 we can see a subprogram and how it’s used by a certain business service. We can also see which files and fields are used and which Natural Construct model generated this subprogram. This could allow us to see, for example, which services are generated by which Natural Construct model or how many subprograms exist that have been generated by using a specific model.

Figure 16: How a subprogram is used by a business service

CONCLUSION

Natural Business Services offers Natural Construct users the ideal tools for SOA-based application development. By enabling you to convert Natural Construct-generated applications to services based on subprograms, Natural Business Services simplifies the transition to a Service-Oriented Architecture. Further, Natural Business Services allows you to easily generate services from Natural Construct by reusing existing Natural business logic. It also makes it easier for developers with no knowledge of Natural to quickly identify and access business services based on Natural applications. Finally, by using terms and expressions similar to those in Natural Construct, a familiar user interface and the robust Natural Construct generation engine, Natural Business Services allows you to work more efficiently and develop new Natural services up to 90% faster.
Take the next step to get there – faster.

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Software AG is the world’s largest independent provider of Business Infrastructure Software. Our 4,000 global customers achieve measurable business results by modernizing and automating their IT systems and rapidly building new systems and processes to meet growing business demands.

Our industry-leading product portfolio includes best-in-class solutions for managing data, enabling service oriented architecture, and improving business processes. By combining proven technology with industry expertise and best practices, our customers improve and differentiate their businesses – faster.

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