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First Edition (July 2003)

This edition applies to Patterns for e-business.

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Preface

As companies compete in the e-business marketplace, they find that they must re-evaluate their business processes and applications so that their technology is not limited by time, space, organizational boundaries, or territorial borders. They must consider the time it takes to implement the solution as well as the resources (people, money, and time) they have at their disposal to successfully execute the solution. These challenges, coupled with the integration issues of existing legacy systems and the pressure to deliver consistent high-quality service, present a significant undertaking when developing an e-business solution. IBM Patterns for e-business provide a structured way of decomposing simple or complex requirements into a layered set of reusable architectures and designs.

This redbook’s focus is on documenting the currently observed usages of the Patterns for e-business. This redbook is part of the Patterns for e-business series. We introduce three identified pattern approaches and examine pattern scenarios for each of them. The three pattern approaches are:

- Approach 1 - Building solutions on the basis of a Single Business pattern
- Approach 2 - Building solutions on the basis of Multiple Business patterns
- Approach 3 - Applying Patterns with existing Custom designs

We discuss the key features and identify guidelines for each of these approaches. We document the alignment of these approaches within a context of a proven methodology, the IBM Global Services Method.

The team that wrote this redbook

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Introduction to Patterns for e-business and pattern approaches

The IBM Patterns for e-business are a collective set of proven architectures that have been compiled from more than 20,000 successful Internet-based engagements. This repository of assets can be used by companies to facilitate the development of Web-based applications. They help an organization understand and analyze complex business problems and break them down into smaller, more manageable functions that can then be implemented using low-level design patterns.
1.1 Introduction to Patterns for e-business

As companies compete in the e-business marketplace, they find that they must re-evaluate their business processes and applications so that their technology is not limited by time, space, organizational boundaries, or territorial borders. They must consider the time it takes to implement the solution, as well as the resources (people, money, and time) they have at their disposal to successfully execute the solution. These challenges, coupled with the integration issues of existing legacy systems and the pressure to deliver consistent high-quality service, present a significant undertaking when developing an e-business solution.

In an effort to alleviate the tasks involved in defining an e-business solution, IBM has built a repository of “patterns” to simplify the effort. In simple terms, a “pattern” can be defined as a model or plan used as a guide in making things. As such, patterns serve to facilitate the development and production of things. Patterns codify the repeatable experience and knowledge of people who have performed similar tasks before. Patterns not only document solutions to common problems, but also point out pitfalls that should be avoided. IBM’s Patterns for e-business consist of documented architectural best practices. They define a comprehensive framework of guidelines and techniques that were actually used in creating architectures for customer engagements. The Patterns for e-business bridge the business and IT gap by defining architectural patterns at various levels from Business patterns to Application patterns to Runtime patterns, enabling easy navigation from one level to the next. Each of the patterns (Business, Integration, Application, and Runtime) helps companies understand the true scope of their development project and provide the necessary tools to facilitate the application development process, thereby allowing companies to shorten time to market, reduce risk, and more importantly, realize a more significant return on investment.

The major types of Patterns for e-business are:

- Business patterns
- Integration patterns
- Composite patterns
- Application patterns
- Runtime patterns and matching product mappings

When a company takes advantage of these documented assets, they are able to reduce the time and risk involved in completing a project.
For example, a Line-of-business (LOB) executive who understands the business aspects and requirements of a solution can use Business patterns to develop a high-level structure for a solution. Business patterns represent common business problems. A LOB executive can match their requirements (IT and business drivers) to Business patterns that have already been documented. The patterns provide tangible solutions to the most frequently encountered business challenges by identifying common interactions among users, business and data.

Senior technical executives can utilize Application patterns to make critical decisions related to the structure and architecture of the proposed solution. Application patterns help refine Business patterns so that they can be implemented as computer-based solutions. Technical executives can use these patterns to identify and describe the high-level logical components that are needed to implement the key functions identified in a Business pattern. Each Application pattern would describe the structure (tiers of the application), placement of the data, and the integration (loosely or tightly coupled) of the systems involved.

Finally, solution architects and systems designers can develop a technical architecture by using Runtime patterns to realize the Application patterns. Runtime patterns describe the logical architecture that is required to implement an Application pattern. Solution architects can match Runtime patterns to existing environment and business needs. The Runtime pattern they implement establishes the components needed to support the chosen Application pattern. It defines the logical middleware nodes, their roles and the interfaces among these nodes in order to meet business requirements. The Runtime pattern documents what must be in place to complete the application but does not specify product brands. Determination of actual products is made in the Product mapping phase of the patterns.

In summary, Patterns for e-business captures e-business approaches that have been tested and proven. By making these approaches available and classifying them into useful categories, LOB executives, planners, architects, and developers can further refine them into useful, tangible guidelines. The patterns and their associated guidelines allow the individual to start with a problem and a vision, find a conceptual pattern that fits this vision, define the necessary functional pieces that the application will need to succeed, and then actually build the application. Furthermore, the Patterns for e-business provides common terminology from a project's onset and ensures that the application supports business objectives, significantly reducing cost and risk.
1.2 The Patterns for e-business layered asset model

The Patterns for e-business approach enables architects to implement successful e-business solutions through the re-use of components and solution elements from proven successful experiences. The Patterns for e-business approach is based on a set of layered assets that can be exploited by any existing development method. These layered assets are structured in a way that each level of detail builds on the last. These assets include:

- Business patterns that identify the interaction between users, businesses, and data.
- Integration patterns that tie multiple Business patterns together when a solution cannot be provided based on a single Business pattern.
- Composite patterns that represent commonly occurring combinations of Business patterns and Integration patterns.
- Application patterns that provide a conceptual layout describing how the application components and data within a Business pattern or Integration pattern interact.
- Runtime patterns that define the logical middleware structure supporting an Application pattern. Runtime patterns depict the major middleware nodes, their roles, and the interfaces between these nodes.
- Product mappings that identify proven and tested software implementations for each Runtime pattern.
- Best-practice guidelines for design, development, deployment, and management of e-business applications.

These assets and their relation to each other are shown in Figure 1-1 on page 5.
1.2.1 Patterns for e-business Web site

The Patterns Web site provides an easy way of navigating top down through the layered Patterns’ assets in order to determine the preferred reusable assets for an engagement.

For easy reference to Patterns for e-business, refer to the Patterns for e-business Web site at:


1.3 How to use the Patterns for e-business

As described in the last section, the Patterns for e-business are structured in such a way that each level of detail builds on the last. At the highest level are Business patterns that describe the entities involved in the e-business solution. A Business pattern describes the relationship between the users, the business organization or applications, and the data to be accessed.
Composite patterns appear in the hierarchy (shown in Figure 1-1 on page 5) above the Business patterns. However, Composite patterns are made up of a number of individual Business patterns, and at least one Integration pattern. In this section, we will discuss how to use the layered structure of the Patterns for e-business assets.

There are four primary Business patterns:

<table>
<thead>
<tr>
<th>Business patterns</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-Service (User-to-Business)</td>
<td>Applications where users interact with a business via the internet and intranet</td>
<td>Simple Web site applications</td>
</tr>
<tr>
<td>Collaboration (User-to-User)</td>
<td>Applications Where the Internet supports collaborative work between users</td>
<td>e-mail, community, chat, video conferencing, etc.</td>
</tr>
<tr>
<td>Information Aggregation (User-to-Data)</td>
<td>Applications where users can extract useful information from large volumes of data, text, images, etc.</td>
<td>Business intelligence, knowledge management, Web crawlers</td>
</tr>
<tr>
<td>Extended Enterprise (Business-to-Business)</td>
<td>Applications that link two or more business processes across separate enterprises</td>
<td>EDI, supply chain management, etc.</td>
</tr>
</tbody>
</table>

*Figure 1-2  Business patterns*

It would be very convenient if all problems fitted nicely into the four Business patterns above, but reality says that things will often be more complicated. The patterns assume that all problems, when broken down into their most basic components, will fit more than one of these patterns. When a problem describes multiple objectives that fit into multiple Business patterns, the Patterns for e-business provide the solution in the form of Integration patterns.

Integration patterns allow us to tie together multiple Business patterns to solve a problem. The Integration patterns include:
These Business and Integration patterns can be combined to implement installation-specific business solutions. We call this a Custom design.

We can represent the use of a Custom design to address a business problem through an iconic representation as shown in Figure 1-4:

If any of the Business or Integration patterns are not used in a Custom design, we can show that using blocks lighter than the other blocks. For example, Figure 1-5 on page 8 shows a Custom design that does not have a mandatory Collaboration business pattern or an Extended Enterprise business pattern for a business problem.
A Custom design may also be a Composite pattern if it recurs many times across domains with similar business problems. For example, the iconic view of a Custom design in Figure 1-5 can also describe a Sell-Side Hub composite pattern.

Several common uses of Business and Integration patterns have been identified and formalized into Composite patterns. The identified Composite patterns are shown in Figure 1-6 on page 9.
<table>
<thead>
<tr>
<th>Composite patterns</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronic commerce</td>
<td>User-to-Online-Buying</td>
<td>• <a href="http://www.macys.com">www.macys.com</a></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• <a href="http://www.amazon.com">www.amazon.com</a></td>
</tr>
<tr>
<td>Portal</td>
<td>Typically designed to aggregate multiple information sources and applications to provide uniform, seamless, and personalized access for its users.</td>
<td>• Enterprise Intranet portal providing self-service functions such as payroll, benefits, and travel expenses.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Collaboration providers who provide services such as e-mail or instant messaging.</td>
</tr>
<tr>
<td>Account Access</td>
<td>Provide customers with around-the-clock account access to their account information.</td>
<td>• Online brokerage trading apps.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Telephone company account manager functions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Bank, credit card and insurance company online apps.</td>
</tr>
<tr>
<td>Trading Exchange</td>
<td>Allows buyers and sellers to trade goods and services on a public site.</td>
<td>• Buyer's side - interaction between buyer's procurement system and commerce functions of e-Marketplace.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Seller's side - interaction between the procurement functions of the e-Marketplace and its suppliers.</td>
</tr>
<tr>
<td>Sell-Side Hub (Supplier)</td>
<td>The seller owns the e-Marketplace and uses it as a vehicle to sell goods and services on the Web.</td>
<td>• <a href="http://www.camax.com">www.camax.com</a> (car purchase)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy-Side Hub (Purchaser)</td>
<td>The buyer of the goods owns the e-Marketplace and uses it as a vehicle to leverage the buying or procurement budget in soliciting the best deals for goods and services from prospective sellers across the Web.</td>
<td><a href="http://www.wre.org">www.wre.org</a> (WorldWide Retail Exchange)</td>
</tr>
</tbody>
</table>

*Figure 1-6 Composite patterns*

The makeup of these patterns is variable in that there will be basic patterns present for each type, but the Composite pattern can easily be extended to meet additional criteria. For more information on Composite patterns, refer to *Patterns for e-business: A Strategy for Reuse* by Jonathan Adams, Srinivas Koushik, Guru Vasudeva, George Galambos, ISBN: 1-931182-02-7.
### 1.3.1 Selecting the Application pattern, Runtime pattern and Product mapping

Once the appropriate Business, Integration, Composite pattern is identified, the next step is to define the high-level logical components that make up the solution and how these components interact. This is known as the Application pattern. A Business, Integration, Composite pattern will usually have multiple Application patterns identified that describe the possible logical components and their interactions. For example, an Application pattern may have logical components that describe a presentation tier for interacting with users, a Web application tier, and a back-end application tier.

The Application pattern requires an underpinning of middleware which is expressed as one or more Runtime patterns. Runtime patterns define functional nodes that represent middleware functions that must be performed.

Once a Runtime pattern has been identified, the next logical step is to determine the actual product and platform to use for each node. The Patterns for e-business have Product mappings that correlate to the Runtime patterns, describing actual products that have been used to build an e-business solution for this situation.

Finally, guidelines assist you in creating the application using best practices that have been identified through experience.

For more information on determining how to select each of the layered assets, refer to the Patterns for e-business Web site at:


### 1.3.2 Common initiations

The question is often raised: how exactly does one find oneself in a position to execute an architectural methodology or apply the Patterns for e-business? Some common ways are described here. Each of these initiations may include a high level use case.

**Executive vision statement**

One of the main objectives of every sales professional is to call as high in the customer's organization as possible. In the course of building these executive relationships, they frequently hear statements such as "I want my business partners to have a single company interface." This is an implicit invitation to spend time understanding multiple parts of the customer organization and uncovering opportunities for software and hardware products to create this vision. This is an opportunity to use the Custom design icon view shown in
Figure 1-4 on page 7 to help the executive decompose his/her vision into the required Business and Integration patterns. For example, when decomposing this vision statement, you find that the Self-Service business pattern and the Access Integration pattern are appropriate. This is shown in Figure 1-7.

This Custom design is illustrated in more detail as a case study in Chapter 4, “Building solutions on a multiple Business patterns basis” on page 49.

Response to an RFP

Many customers, primarily in the public sector, use a Request for Proposal (RFP) process. This provides invited vendors with a set of technical requirements, use cases, and evaluation criteria to address already identified customer needs. This also provides information necessary to understand the high level business functions of the proposed solution. Understanding the high level business functions is an excellent starting point to decompose into the customer requirements and identify the necessary Business and Integration patterns. For examples of how the Patterns for e-business contribute to shaping the reply to a RFP, refer to the subsequent chapters in this redbook.

Response to “Line of Business” executive (CRM, SAP, WebSphere)

In spending time getting to understand a customer’s business, consultants will often hear LOB executives express requirements such as “We must improve the responsiveness of the account inquiry desk by making simple inquiries available to our customers and provide a starting point for future e-business development”.

Chapter 1. Introduction to Patterns for e-business and pattern approaches 11
This is an invitation to start investigating a core part of this customer’s operation and use the Custom design icon view to decompose this business issue. For example, this business problem can be decomposed into a single Business pattern. The Custom design icon view is shown in Figure 1-8.

This Custom design is illustrated in more detail as a case study in Chapter 3, “Building solutions on a Single Business pattern basis” on page 27.

**Requested technical solution**

Sometimes, a middleware requirement identifies itself like this: “We need to integrate our WebSphere and Domino systems”. This technical solution is a commonly heard request. In these situations, we may be able to circumvent or shorten many steps in the methodology and move right to the Patterns for e-business using an existing Custom design. For examples of existing Custom designs, refer to Chapter 5, “Applying Patterns with existing Custom designs” on page 85.

1.4 Applying Patterns approaches

Three identified Patterns for e-business approaches will be examined in this redbook. They are as follows:

- Building solutions on the basis of a Single Business pattern
  
  Use the patterns for a specific solution based on a single Business pattern.

- Building solutions on the basis of Multiple Business Patterns
Implement a single coarse-grained application associated with one high-level use case using a Custom design employing multiple Business and Integration patterns.

- Applying Patterns with existing Custom designs (for example, WebSphere and Domino integration)

The existing Custom design solutions, like Composite patterns, combine Business and Integration patterns to create advanced, end-to-end e-business applications. These solutions, however, have not been implemented to the extent of the Composite patterns. While some of the existing Custom designs that we discuss have been proven, their use has been in a limited number of engagements and they are not yet defined as a Composite pattern.

This redbook will provide the reader with usage recommendations, case studies for each of the approaches, as well as the alignment of these approaches within a methodology framework. Many IT consulting firms have developed and proven methodologies. It is worth noting that the Patterns for e-business can be exploited within any comprehensive application development methodology. This redbook will demonstrate such an approach and illustrate how the Patterns can be applied to the development phases within the IBM Global Services Method.

1.4.1 Patterns for e-business in software solutioning

By using proven methodologies in conjunction with Patterns for e-business, you will be able to develop a solution which uses common terminology from the onset of the project. Patterns for e-business can be easily aligned to existing application development life cycles when addressing a complex business goal and/or requirement. Patterns for e-business are not a software methodology. Patterns for e-business complement any known software methodology. For example:

- Solution Outline phase of a project - an organization can quickly infer the overall shape of the required solution by matching its Business and IT goals/objectives to the Patterns for e-business architectural assets and follow the navigation through the asset catalogue to derive a 1st cut definition of a solution meeting their business requirements. This approach will allow the architect the focus on the most challenging areas of the proposed solution by concentrating on the architecturally significant requirements.

- Macro Design phase of a project - based on all requirements, the results arrived at during the Solution Outline phase of the project can be validated and further refined leading towards the definition of the target solution based on the relevant Application, Integration and Runtime patterns and taking into account the Product mapping suggested by Patterns for e-business.
Micro Design phase - the results delivered at the end of the Macro Design are further detailed taking into account the technology and product selection made previously in order to prepare for the subsequent Build phases.

Development and testing of the solution - one can leverage more than twenty Redbooks that have been published under the IBM Patterns for e-business series.

Through re-use of these proven approaches, IT architects, in 80% of cases, will be able to analyze a business problem and quickly develop a required solution to address it.

1.5 Structure of this redbook

The intent of this redbook is twofold:

1. Education on the different pattern approaches.
2. Examples based on roles

Based on your primary role and interest in the redbook, you may find that you read all the chapters for education on the different pattern approaches or you may read specific chapters. You may read each chapter independently of the others if you are solely interested in the approach of a single business solution, for example. We encourage you to take a look at the table of contents for help in deciding which chapters to read. However, each of the chapters includes information that every reader will be interested in and be able to apply to his/her job for a more rounded picture. A Patterns glossary has also been added to this redbook with definitions of the terminology used.

The remainder of this redbook is structured with the following chapters:

- Chapter 2, “Business Solution Delivery methods” on page 17
  This chapter describes the IBM Global Services Method (The Method).
- Chapter 3, “Building solutions on a Single Business pattern basis” on page 27
  This chapter describes a case study leveraging a single Business pattern using the IBM Global Services e-business Custom engagement model.
- Chapter 4, “Building solutions on a multiple Business patterns basis” on page 49
  This chapter describes a case study using a case study leveraging multiple Business patterns using the IBM Global Services e-business Custom engagement model.
- Chapter 5, “Applying Patterns with existing Custom designs” on page 85
This chapter covers three existing Custom designs.
Business Solution Delivery methods

This chapter describes the iterative and incremental Business Solution Delivery methods used to build an e-business application starting from requirements gathering and ending with deployment. Many projects rely on mature methods for successfully delivering business solutions. In these methods, the definition of the overall architecture is one of the critical activities. It is precisely to these activities that the Patterns for e-business make their most significant contribution.

In subsequent chapters, we will discuss how the Patterns for e-business effectively contribute to the definition and delivery of business solutions using several case studies. Throughout these case studies, the IBM Global Services Method will be used as the overall context within which the Patterns for e-business related activities take place. But in principle, any other delivery method could be used to provide such a context.

This chapter will introduce the key concepts of the IBM Global Services Method and explain the phase/activity structure which is used by the Method to structure the overall delivery of a business solution and serves as the backdrop to the Patterns for e-business related activities.
2.1 Introduction to IBM Global Services Method

The IBM Global Services Method provides a comprehensive body of knowledge allowing practitioners to conduct engagements in a standardized fashion by relying on predefined engagement models and delivering the overall business solution via the creation of a number of well defined work products. As such, the Global Services Method is one of the cornerstones supporting IBM Global Services' goal of shifting its business model towards the delivery of asset-based services by providing a mechanism for practitioners to systematically reuse knowledge and assets using a consistent and integrated approach.

We will briefly introduce a number of key concepts defined within the IBM Global Services Method before discussing each one of these in more detail.

The IBM Global Services Method itself is organized around a number of method families. Method families reflect the close relationships between a number of engagement models applicable to the same domain such as e-business (grouped in the e-business method family), application maintenance (grouped in the application maintenance services method family), etc.

Engagement models describe typical approaches in delivering a project in terms of a work breakdown structure to be adhered to, the work products to be created, the techniques to be applied and the roles (in terms of skills) to be allocated to the project.

The work breakdown structure describes the sequence of phases, activities and tasks to be performed in order to deliver the business solution. During these tasks, one or more work products are created and/or updated using one of the available techniques in the Method.

Work products can refer to any tangible asset produced during an engagement.

It should be noted that defining the actual engagement model to be used on a project is one of the key activities of the initial phase of any project. During this activity, referred to as method tailoring, the actual phases, activities and tasks will be defined, as well as the relevant work products and techniques. The need for method tailoring underlines the fact that the IBM Global Services Method caters to many different types of engagements and will always require customization to make it applicable to a specific project.
2.1.1 Work Products and Work Product Descriptions

Work products (WP) are one of the key elements of the IBM Global Services Method. Work products are tangible artifacts that are produced during a project. They include models, reports, diagrams, plans, code and other documents that are direct stepping stones towards the delivery of the business solution. They have a specific purpose in the engagement and describe specific content using predefined semantics and syntax. Work products are produced as a result of performing one or more tasks. Some tasks produce less tangible outputs (for example, pass/fail, trained students) which are then called outcomes.

Work products are not the same as deliverables. The term deliverable is used to refer to a document which contractually needs to be delivered to the customer, which is not necessarily the case for work products. Some WPs are effectively used as intermediate artifacts and are not intended to be delivered to the customer. All deliverables are created from work products, but not all work products are deliverables.

A Work Product Description (WPD) describes a particular type of work product and gives guidance on the following:

- How to create the actual work product
- Notation
- The recommend structure of the work product itself

The WPDs cover a broad range of work performed on engagements and have been further organized into a number of domains (six in total) and subdomains to further categorize content where needed. These WPDs are available to all engagement models. The six high-level domains are as follows:

- Engagement: includes those WPDs used to define, plan, manage, and close an IBM Global Services Method engagement.
- Business: provides the WPDs needed to conduct a structured investigation of the current and desired situations in a customer's business in order to develop and implement the appropriate solution.
- Organization: contains the WPDs used to assess organizational and cultural impacts and issues, in order to determine the customer's ability to absorb the change required to develop and implement a new solution.
- Application: provides WPDs for the full life cycle of application development including design, development, testing and maintenance of applications.
- Architecture: contains the WPDs used to structure a solution architecture, including the hardware and software components, the externally visible interfaces and the relationships among them.
Operations: includes the WPDs pertaining to the ongoing operations of a solution, including facilities management, problem reporting, information technology management and security considerations

2.1.2 Method families and Engagement Models

In addition to the Work Product Descriptions, the Global Services Method also provides guidance on how engagements should be conducted. This guidance is delivered through a number of Engagement Models that represent how typical projects are conducted. These Engagement Models have themselves been further organized into seven method families.

Engagement models provide guidance on the required phases, activities, and tasks (often referred to as the work breakdown structure, or WBS), the Work Products to be produced, the roles to be assigned to the project, and any applicable techniques.

A Work Breakdown Structure (WBS) is a default, skeleton plan. It breaks down the work of the project into a hierarchical structure that includes the phases of the engagement model and the aforementioned activities and tasks. A WBS decomposes what must be done to fulfill the objectives of the project into progressively smaller and more manageable units of work. The WBS describes dependencies between work items and establishes various checkpoints to control the work. With the dimensions of time and resources added, the WBS can be transformed into a project plan. An example of the partial WBS for the e-business Custom engagement model is shown in Figure 2-1.

<table>
<thead>
<tr>
<th>Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>▼ Engagement Model: e-business Custom</td>
</tr>
<tr>
<td>▼ PHASE: Solution Start up</td>
</tr>
<tr>
<td>▼ PHASE: Solution Outline</td>
</tr>
<tr>
<td>▼ ACTIVITY: Initiate Solution Outline</td>
</tr>
<tr>
<td>▼ TASK: Analyze Risks</td>
</tr>
<tr>
<td>Role (Performs): Producer</td>
</tr>
<tr>
<td>Role (Performs): Project Manager</td>
</tr>
<tr>
<td>Role (Assists): Lead Architect</td>
</tr>
<tr>
<td>Role (Assists): Solution Designer</td>
</tr>
<tr>
<td>Role (Assists): Solution Leader</td>
</tr>
<tr>
<td>Work Product (Input): ENG 343 Project Definition</td>
</tr>
<tr>
<td>Work Product (Input): ENG 351 Risk Definition</td>
</tr>
<tr>
<td>Work Product (Output): ENG 351 Risk Definition</td>
</tr>
</tbody>
</table>

*Figure 2-1  Example of a Work Breakdown Structure for initiate solution outline*
As you can see from Figure 2-1 on page 20, the WBS gives a complete description of a task embedded within its phase/activity context. Throughout the engagement model, many tasks, roles, and work products appear multiple times, illustrating that many work products are revisited and further completed during the running of the project which in itself underlines the iterative and incremental nature of the approach supported by the method.

Relevance of the Global Services Method for proposal development

The knowledge embodied in the Global Services Method under the form of the work breakdown structure (WBS), work product descriptions and techniques, is not only useful during the delivery of a project, but also during the development of a project proposal. This effort, typically limited in time, can also be organized around a subset of the WBS defined in the Method. The definition of the WBS, work products to adopt and techniques to apply would take place during the proposal-specific method tailoring activity. The domain structure and Work Product Descriptions of the Method can also help to ensure adequate coverage of the problem domain and help to organize the definition of key aspects of the proposed solution.

One of the key benefits of working during proposal development with a subset of the work products relevant to the solution delivery project is that the proposed solution is already expressed in terms of the work products that will be used by the delivery team.

To illustrate this point, we have structured some of the case studies presented in the following chapters to clearly show how the initial work undertaken during proposal development can feed into the work undertaken during solution delivery.

Introduction to specific engagement models

The IBM Global Services Method Release 4.0 catalog currently details some twenty method families, some of which are listed below:

- Application Management Services
- Business Intelligence
- Custom Application Development
- e-Business
- e-Procurement
- Enterprise Architecture Consulting
- Packaged Solution Integration
For the purposes of this chapter, we will discuss one method family: e-Business.

The e-Business method family consists of the following engagement models:

- e-business Custom
- e-business Design
- e-business Express
- e-business Strategy

For the purposes of providing a business solution delivery method context to our case studies, we will further detail one engagement model: the e-business Custom engagement model from the e-Business method family.

### 2.2 e-business Custom engagement model

The e-business Custom engagement model is intended for medium to large custom, media-rich, interactive application development projects with a major online or new media delivery aspect: Internet, intranet, extranet, CD-ROM, DVD, DVD-ROM, kiosk, etc. This model emphasizes the importance of creating a compelling user experience that extends a company's brand identity into the new medium.

Special attention is paid to the design and implementation of a large number of new media elements: audio, video, motion graphics, still graphics, copy, etc. The majority of the new source code produced is either media platform based (Shockwave, Flash, HTML, DHTML, Java-script, Perl, CGI, etc.) or object-oriented (Java, C++, Smalltalk, etc.).

The overall phasing of an e-business Custom engagement model is shown in Figure 2-2 on page 23.

- **Solution Startup**: covers the required start activities.
- **Solution Outline**: provides the client with the necessary costs, schedule and risk information to make an informed investment decision regarding a potential new system.
- **Macro Design**: develops a robust architectural framework upon which to build agile releases.
- **Micro Design**: prepares for the build cycle of a specific release of the system by driving the architecture and design to a release- and implementation-specific view.
- **Build Cycle**: incrementally develops and tests the system until the objectives of the release are achieved.
- **Deployment**: deploys the system and prepares for the next release of the system.
Solution Close: covers the required close activities.

As shown in Figure 2-2, the Solution Outline and Macro Design phases are only conducted once, whereas the three phases that jointly make up a Release can be performed many times, each time resulting in a release of the system. The Solution Startup and Solution Close phases bracket the overall engagement.

The following sections will discuss these phases in more detail.

### 2.2.1 Solution Startup phase

The Solution Startup phase focuses on the activities and tasks needed to define, plan and start an engagement. It is important to carefully define and plan a project up front. All key stakeholders must clearly understand and support the scope and objectives of the project. This will allow you to identify risks that could negatively impact the project and the team's ability to deliver.

The main focus of the activities during this phase is to tailor the engagement model in order to determine the actual phase/activity/task structure that will be followed during the project and the work products that will be created throughout the project. Once these decisions have been taken, the actual project plan detailing all phases/activities/tasks and their associated resources and timing can be defined.
2.2.2 Solution Outline phase

During the Solution Outline phase, the high level business requirements, business objectives and IT objectives are taken into consideration, focusing each time on those requirements/objectives influencing the overall architecture. Based on these requirements, an overall architecture is defined (the solution outline). The primary objective of this phase is to determine the complexity and scope of the solution. If we understand the complexity and scope, we are able to provide the client with the necessary information to make the investment decision.

Several activities are carried out during the Solution Outline phase, each with the objective of determining the main requirements (functional as well as non-functional) and formulating an initial approach to tackle these requirements. Multiple areas within the requirements domain may be considered, such as:

- Current IT environment
- Security
- User experience
- Business impact

Some of those may not be applicable, depending on the scope of the given project.

2.2.3 Macro Design phase

During Macro Design, the overall architecture of the IT system is specified, which allows one to define solution-wide approaches for addressing both the functional and non-functional requirements. This overall architecture acts as a frame of reference for each of the subsequent releases which will deliver (parts of) the architecture such that the release-specific objectives can be achieved. Also, the more detailed work carried out during these releases will be used to refine the overall architecture.

In general, it is far better to spend time up front in Macro Design to address the design issues that impact every release (global decisions) than to rush off to deliver a particular release. The standards, guidelines and architectural work products developed in Macro Design will minimize long term development costs by eliminating as much rework as possible in going from one release to the next.

The Macro Design phase groups activities moving the work forward started during the Solution Outline. The main objective is to confirm the approach and decisions taken during that phase. Typically, the approach defined during the Solution Outline is based on the analysis of the architecturally significant functional and non-functional requirements, and will now be validated by considering all requirements.
2.2.4 Micro Design phase

The purpose of the Micro Design phase is to prepare for the Build Cycle of a specific release of the system by driving the architecture and design to a release and implementation specific view.

A number of activities take place during this phase, among which:
- The specification of the required training and end-user support for a particular release.
- The refinement of the architecture based on the technology and product selection.
- The execution of the static testing processes.

2.2.5 Build Cycle phase

The purpose of the Build Cycle phase is to incrementally develop and test part of the system until the objectives of the overall release are achieved. Releases are defined as increments of the overall solution that are effectively made available to the customer, each release consisting of a Micro Design phase, one or more Build Cycles and a Deployment phase.

Earlier phases of the Method address the requirements and outline the solution based on these requirements. In a complex solution involving several aspects of the business, the overall solution can be broken down and delivered in smaller increments, releases, each with their own objectives. Within a specific release, multiple Build Cycles could be planned, each with their own objectives in line with and contributing to the overall Release specific objectives. Such a Build Cycle would then consist of a single programming and user experience implementation cycle. In this way, an iterative and incremental implementation approach is adopted which delivers more and more functionality of the overall system with each release/cycle.

2.2.6 Deployment phase

The purpose of this phase is to deploy the system and prepare for the next release of the system.

A number of activities are included in this phase, covering areas such as:
- The setup of the production environment
- The execution of the acceptance tests
- The cut over to production
2.2.7 Solution Close phase

The Solution Close phase is a formal closure to the entire project. During this phase, the results of the project are assembled, analyzed and archived for use by other practitioners. Solution Startup and Solution Close are the bookends to every engagement. Just as Solution Startup is largely an introduction to the project, Solution Close is essentially a wrap-up.

2.3 Conclusion

A sound and mature Business Solution Delivery method is one of the essential ingredients of any approach for delivering effective solutions. In practice, the Patterns for e-business can make an important contribution to the definition of (parts of) the overall solution. This contribution is typically made during the architecture definition related activities. Therefore, as we step through the remaining chapters of this book, we will be focusing on defining e-business solutions addressing real business cases where the Patterns for e-business deliver a significant part of the overall solution. In these chapters, the use of the Patterns for e-business will be illustrated within the overall context of the IBM Global Services Method.
Building solutions on a Single Business pattern basis

In this chapter, we explore how the Patterns for e-business can contribute to the development of a solution based on a single Business pattern. It will be made clear that the Patterns for e-business are not a replacement for any development method in use during solution design or delivery, but are essentially an asset selection technique together with a rich set of associated assets that can be used during the phases/activities of a solution design/delivery project. In order to relate the contribution of the Patterns for e-business to the various phases and activities of solution design (project proposal) and solution delivery, the overall discussion has been framed within a high level description of the overall phase/activity structure of the e-business Custom engagement model of the IBM Global Services Method.
3.1 Using the Patterns for e-business during proposal development

Table 3-1 gives an overview of some of the activities occurring during the development of a project proposal. Typically, these activities can take place in various contexts, such as during the preparation of a proposal linked to a particular RFP (Request for Proposal) or during the definition of a project proposal by an internal customer team. We will focus on those activities for which the assets of the Patterns for e-business are of most value.

Table 3-1 Proposal development and the IBM Patterns for e-business

<table>
<thead>
<tr>
<th>Proposal Development (SolutionDesign) activities</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying Requirements</td>
<td>The navigation of the Patterns for e-business asset catalog starts from a broad categorization of business requirements. Not only do these guide the asset selection process but they also offer additional insights into the overall business area and the main business drivers.</td>
</tr>
<tr>
<td>Documenting the Client Environment</td>
<td>The information found in the request for proposal (RFP) or available to the customer team will help to document the current IT environment of the client. This information is key during the later stages of the asset selection process and at the same time creates an opportunity for a focused analysis of the request for proposal or the available documentation.</td>
</tr>
<tr>
<td>Defining the solution</td>
<td>Patterns for e-business contribute significantly to the definition of the solution to be proposed.</td>
</tr>
</tbody>
</table>

3.1.1 Case study for proposal development

We will now discuss each of the activities outlined in Table 3-1 in the context of the First Financial case study.
Identifying requirements
Based on requirements communicated by First Financial, a large financial services company, the project proposal team has developed the following understanding of the business context.

First Financial is looking to provide a Web channel for their existing credit card system. To accomplish this, they wish to Web-enable the existing CICS credit card application for account access, rewards programs, credit line increases, etc.

First Financial's business objectives are:
- Reduction of time to market
- Tactical focus on only supporting the Web channel.
- Strategic focus on supporting multiple access channels such as call center, telephone access, etc.
- Leverage legacy investments and the existing CICS skill base.

Documenting the client environment
The key elements characterizing the customer's environment are:
- A requirement to access an existing CICS-based application
- A strong emphasis on the privacy of the exchanges between the front-end and the existing applications and the authentication of a client before any access to an existing application is allowed
- A preference for Windows 2000/xSeries® servers to host the Web infrastructure
- A current installed base of either Windows 2000/xSeries or zSeries

Defining the solution
Based on the information gathered from First Financial (and summarized in the previous sections), we decide to use the Patterns for e-business for a fast path definition of a suitable and proven solution meeting the business requirements of the company. This fast path approach is only expected to provide an 80% fit for the full set of First Financial's requirements, so a comprehensive development method will still be needed to customize these assets to result in a 100% fit.

These patterns should be considered candidate assets that leverage the experience of architects to create solutions quickly, whether for small local businesses or large multinational enterprises. Specifically in the context of the development of a project proposal, the ability to quickly translate requirements into a coherent and viable solution is extremely valuable. Also, the proven product configurations documented in the Patterns for e-business asset catalog contribute significantly to producing a high quality project proposal on time.
The key elements contributed by the Patterns for e-business are:

- Identification of required functionalities
- Product selection guidance
- Information regarding the interactions between products

For the purposes of the proposal, the following four-step procedure is used to arrive at the recommended solution:

1. Selection of the Business pattern(s):
   An analysis of the high-level business requirements described above indicates that the Self-Service business pattern may be applicable to this solution.
   - Self-Service business pattern
     In this particular case, First Financial is interested in extending an existing credit card legacy application through a Web channel to its customer/user base. The Self-Service business pattern is applicable if the requirements suggest that users need to interact directly with legacy data.

2. Selection of the Application pattern(s):
   The Application pattern focuses on the application level functionality required to support the identified Business pattern(s).

   Based on the available information, the Router application pattern is selected.
   - Router application pattern
     First Financial plans to provide access to its existing back-end systems via different channels (initially only a Web channel, but the call center and telephone have been identified as future extensions). The Router application pattern provides a structure for applications that require the intelligent routing of requests from multiple delivery channels to one of multiple back-end applications.

3. Selection of the Runtime pattern(s):
   The Runtime pattern focuses on the technical functionality needed to support an Application pattern.

   - Router runtime pattern
     In this Runtime pattern, the functions of the router tier are performed by an integration server.

4. Obtaining the Product mapping:
   Given the existing base of Windows 2000/xSeries servers, the Product mapping based on a deployment on Windows 2000/xSeries servers is selected.
This Product mapping gives us immediately an overview of the required products and their relationships.

Based on the information obtained from the Patterns for e-business, the proposal can then be further developed by:

- Estimating the mandays needed to build new functionality or to integrate existing functionality
- Estimating the software budget, taking into account, among other elements, the suggested software products
- Specifying the resource profiles required to deliver the solution (among others derived from selected products)
- Specifying the tooling required for development (among others derived from selected products)

Note: Other factors are crucial in being able to realistically budget for the proposed solution, like sizing estimates, available skills and other relevant non-functional requirements (availability, performance, etc.), but these are outside the scope of this discussion.

3.1.2 Summary

This section showed how the Patterns for e-business can be used very effectively in defining (a part of) the solution in response to a request for proposal. The Patterns for e-business allow us to arrive very quickly at such a solution via an asset selection process starting from an analysis of the main business and IT drivers present in the request for proposal. The obtained results, expressed in terms of required software products, can be used immediately to drive the budgeting aspect of the solution design and will increase the overall technical quality of the proposal given its reliance on the proven software and hardware product combinations found in the Patterns for e-business asset catalog.

3.2 Using the Patterns for e-business during solution delivery

In Table 3-2 on page 32 below, we give an overview of the various activities undertaken during solution delivery. We will focus on the activities related to requirements gathering and architecture definition because the Patterns for e-business provide the most added value in these areas by:
- Clarifying the applicable requirements (which are subsequently used to drive the selection of the applicable patterns and assets)
- Delivering standard application and product configurations which can reduce the architecture related development effort

Table 3-2 IBM Global Services Method and IBM Patterns for e-business

<table>
<thead>
<tr>
<th>Solution Delivery Phases</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase: Solution Startup</td>
<td></td>
</tr>
<tr>
<td>Defining the project approach</td>
<td>Starting from the approach outlined in the project proposal, confirm and refine the proposed approach based on any additional information. This is usually done both with the project team and client personnel. The use of the IBM Patterns for e-business will be taken into account during this stage since this will help to shape the overall approach.</td>
</tr>
<tr>
<td>Phase: Solution Outline</td>
<td></td>
</tr>
<tr>
<td>Identifying requirements</td>
<td>The focus of this activity is to gather the overall business requirements and objectives, concentrating on those that will have a significant impact on the solution. One technique which supports getting an overall view of the solution’s requirements involves the development of a system context diagram. This diagram represents the proposed solution, emphasizing the interactions to be supported with its environment, both in terms of people and/or systems. The Business patterns can provide richness to this diagram by relating it to similar trends in other industries while at the same time allowing for the validation of the selected pattern(s).</td>
</tr>
<tr>
<td>Solution Delivery Phases</td>
<td>Added value of the IBM Patterns for e-business</td>
</tr>
<tr>
<td>--------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td><strong>Defining the high level architecture</strong></td>
<td>The main objective of this activity is to get an overall view of the structure and topology of the system to be delivered so that appropriate attention can be given to the more challenging areas of the proposed solution. Based on the architecturally significant requirements, the architect will validate the business and IT drivers from the client and match these against the ones associated with the patterns. This process will then lead to the identification of the involved Application patterns. The applicable Application patterns can be documented as part of an architecture overview diagram which would feature, for example, the Router application pattern. An adopted Application pattern will lead the architect to a specific set of Runtime patterns and Product mappings, taking into account the actual IT environment of the customer. It is very important that at this stage an accurate assessment be made of any gaps between the identified assets and the actually required solution so that adequate attention can be given to those areas through either the selection of additional products or through custom development.</td>
</tr>
<tr>
<td><strong>Phase: Macro Design</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Identifying requirements</strong></td>
<td>The focus of this activity is to gather and refine all applicable requirements (instead of focusing only on the architecturally significant ones) so that the results from the 'Identifying requirements' activity performed during the Solution Outline phase can be confirmed and further refined.</td>
</tr>
<tr>
<td>Solution Delivery Phases</td>
<td>Added value of the IBM Patterns for e-business</td>
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<td>------------------------------------------</td>
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</tr>
<tr>
<td><strong>Defining the architecture</strong></td>
<td>This activity will focus on specifying the overall architecture, in terms of how it addresses the functional and non-functional requirements so that in subsequent phases, a start can be made on its implementation. During this activity, the architecture defined during the Solution Outline phase will be confirmed and further refined.</td>
</tr>
<tr>
<td></td>
<td>This time we will review the Patterns selected during the previous phase based on all known requirements. Once the Business patterns have been confirmed, the following steps can be taken:</td>
</tr>
</tbody>
</table>
|                                          | 1. Finalize the Application patterns to be used.  
2. Select the Runtime pattern for each of the identified Application patterns.  
3. After selecting the Runtime patterns, an experienced architect should integrate these patterns into the overall architecture.  
4. Perform the Product mapping on the basis of the current IT environment of the customer.  
For the selected Runtime patterns, review the Product mappings on the Patterns Web site at: http://www-106.ibm.com/developerworks/patterns/u2b/at5-product-map.html                                                                                                                                                      |
|                                          | This information can be used as a guideline for selecting the products in the case these have not yet been defined.                                                                                                                                                                                                                                     |
|                                          | In situations where the client has already predefined an infrastructure, the information on this Web site can be used to validate the decisions that have been made, again based on the previously identified Business, Integration, Composite, Application and Runtime patterns.                                                                                                   |
| **Building the development environment**  | Review the application development chapters of the applicable pattern Redbooks to support the definition of the development environment.                                                                                                                                                                                                                   |
|                                          | Additionally, review product installation instructions in the applicable pattern Redbooks to assist with the product installs for the development environment.                                                                                                                                                                                                  |
Chapter 3. Building solutions on a Single Business pattern basis

3.3 Case study for solution delivery

Now we begin the Solution Delivery for First Financial.
3.3.1 Solution Startup phase

During this phase, we will seek to confirm the overall approach for the project as originally defined in the proposal. An important input to this activity is the information previously made available by First Financial and the actual solution proposed. Particularly relevant for this phase is the information related to the possible use of assets during the engagement.

For the purposes of this section, we will assume that the problem setting introduced in the proposal development section is still valid.

Defining the project approach

The focus of this activity is to familiarize the project team with the development method, assessing training and mentoring needs and tailoring the development method to the needs of the project taking the use of assets into account.

An important step in starting any project is to become familiar with any candidate assets that may be useful during the development of the solution. The use of assets can improve the profitability of a project as well as lower its risk given that the solution will be based on assets used in previous successful implementations. The candidate assets we are particularly interested in are the Patterns for e-business. The starting point for the work undertaken on First Financial's project is the architecture defined in the project proposal.

3.3.2 Solution Outline phase

During the Solution Outline phase, the overall shape and style of the system is decided based upon an analysis of the key requirements. The emphasis during this phase lies much more on identifying all the required functionalities than on exploring each one in detail. The overarching objective is to get an accurate view of the overall effort required to deliver the system. Consequently, attention will be paid specifically to those areas deemed to be particularly challenging.

Identifying requirements

The objective of the “Identifying requirements” activity during the Solution Outline phase is to gather the overall business requirements and objectives, particularly concentrating on those which will have a significant impact on the solution.

Starting with the requirements expressed by First Financial and the way these were interpreted in the project proposal, we will reexamine the customer's requirements in more detail.

If this initial information is not available, then some of the steps normally taken during the proposal development will be performed at this time, for example, identifying the high level requirements.
During this phase of the project, we want to obtain more detailed requirements so that we can identify the actors and key business functions to be delivered by the proposed solution.

During the requirements gathering effort, involving First Financial's personnel, the following additional non-functional requirements were obtained.

- The application must support multiple languages.
- Performance must be enhanced over existing Web-based applications.
- Capacity/logon (500 logons and fifty transactions every minute).
- Scalability (10 000 users in two years).
- Security (secure transaction support, strong encryption and connections to CICS are only allowed if authenticated).
- Technology constraints (front end access is Netscape and IE browser-based, CICS V4.1 for legacy).

Based on all available requirements, we develop a system context diagram illustrating which interactions with users and other systems will need to be supported by the new system. This diagram also confirms our use of the Self-Service business pattern as it supports direct interactions between interested parties and a business.

As you use the Patterns, it is important to keep in mind that, although we may frequently refer to the “users” of a system, in many cases the user can be almost any person, process, or thing, provided the pattern fits the situation and the user exercises the business process.

The system context diagram for First Financial is shown in Figure 3-1 on page 38.
The Patterns for e-business can also be useful for identifying requirements by drawing attention to various business and IT drivers that will be used as input to the Application pattern selection process. At the same time, focusing on these key requirements (or key drivers) will facilitate the subsequent identification of the relevant patterns.
Defining the high level architecture

The main objective of this activity is to get an overall view of the structure and topology of the system to be delivered so that appropriate attention can be paid to the more challenging areas of the proposed solution.

In this particular case, we will focus on the use made of the Patterns for e-business assets. Also, we want to reevaluate the architectural decisions taken during proposal development on the basis of all requirements known at this stage.

On the basis of the currently known requirements, we confirm the Self-Service business pattern as the Business pattern most closely supporting our requirements.

Figure 3-2 and Figure 3-3 on page 40 present the typical business and IT drivers (shown as row headers) versus the Application patterns (shown as column headers) for the Self-Service business pattern.

<table>
<thead>
<tr>
<th>Business Drivers</th>
<th>Stand-Alone</th>
<th>Single Channel</th>
<th>Directly-Integrated</th>
<th>Single Channel</th>
<th>As-is Host</th>
<th>Customized Presentation to Host</th>
<th>Router</th>
<th>Decomposition</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to market</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve the organizational efficiency</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce the latency of business events</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy to adapt during mergers and acquisitions</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Integration across multiple delivery channels</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United customer view across Lines of Business (LOB)</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Support effective cross-selling</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass customization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3-2  Business Drivers of the Self-Service business pattern
The next step is to select an appropriate Application pattern. A salient feature of the Patterns is that although each of us may work with customers in many different industries, there are a number of well understood, common approaches that work well across industries. Also remember that although Patterns are ways of associating requirements and solutions, there are always different ways of physically implementing them.

In reviewing the Business and IT drivers from Figure 3-2 on page 39 and Figure 3-3 above, we can confirm that the Self Service::Router application pattern is still the best fit. The Multiple Channel requirement maps clearly back to the key Business driver expressed by First Financial and Leveraging Legacy Systems is one of their main IT related concerns. These two support the use of the Router application pattern. Further support for using this pattern runs as follows.

*Figure 3-3  IT Drivers of the Self-Service business pattern*
The Router application pattern supports multiple delivery channels connecting to one or more back-end legacy applications through a router tier. This router tier can route a single message to one or more applications within the same business process. This is in line with First Financial's requirements as noted below in Figure 3-4. The router tier can process a single request within this business line and access the required legacy systems to produce a response, in this case the rating and underwriting systems. Refer to Figure 3-5 on page 42 for an example of the Router application pattern.

![Figure 3-4  Self Service, User to Multiple Applications](image)
The overall solution can be documented via an architecture overview diagram showing how the Router application pattern integrates within the overall proposed solution.

The selection of an Application pattern leads to a set of specific Runtime patterns.

In the Router application pattern, the router tier serves as an integration point for delivery channels in the presentation tier, allowing access to individual back-end applications. In the following Runtime pattern, which support the Router application pattern, the functions of the router tier are performed by an integration server. Figure 3-6 on page 43 shows a Runtime pattern for Self-Service::Router.
Each of the nodes identified in the diagram above is described in detail on the Patterns for e-business Web site. Refer to the following URL for more information:


Once the Runtime pattern has been established, the corresponding Product mapping can be defined, taking into account the actual IT environment of First Financial. At this stage, we will only concentrate on having an overview of the products which will support the overall solution. This is done with a view to make an accurate assessment of any gaps between the identified assets and what is needed to construct the solution. In this way adequate attention can be given to the definition of those areas for which additional products or custom development will be required. Also, we will focus on the integration points between the involved products in order to assess the effort involved in effectively achieving their integration. Given that the product configurations proposed by the Patterns for e-business reflect proven solutions, this integration will not pose significant problems.
3.3.3 Macro Design phase

During the Macro Design phase, we begin to develop the complete specification of the architecture in line with the work carried out during the Solution Outline phase. The Macro Design phase also lays the groundwork in preparing for the subsequent releases by developing a robust user interface and architecture capable of withstanding reasonable business change through the delivery of these releases and beyond. The Patterns for e-business will further support the activities undertaken at this stage.

Identifying requirements

Whereas “Identifying requirements” during the Solution Outline phase referred to the activity of determining the key requirements influencing the overall architecture, we will now concentrate on refining the system specification based on all user requirements, business processes and business requirements by elaborating the system requirements and specifications. This will enable us to

▶ Make better estimates for the first release.
▶ Provide an overall specification for the structure and topology of the system.

Defining the architecture

Many of the activities in this phase are similar to those carried out during the Solution Outline phase. In this phase, we will focus on specifying the overall architecture, both from a structural and topological point of view so that in a subsequent phase, a start can be made on its implementation. During this activity, confirmation will be sought of the decisions taken during the Solution Outline phase.

This is an opportunity to update the architecture overview diagrams based on any new information obtained thus far.

This effectively implies that we will verify during the Macro Design stage that any additional functionalities are catered for by the products suggested by the Patterns for e-business catalog or that these functionalities will be delivered by other products or earmarked for custom development.

During this stage, the Product mappings will be refined to include the exact specification of product levels to be used in putting the solution together. A suggested Product mapping for First Financial's project is shown in Figure 3-7 on page 45.
Building the development environment

The purpose of “Building the development environment” is to put the hardware and software into place to support the development activities and any associated tools.

The Patterns for e-business Redbooks can also be leveraged in building this development environment. For each of the involved products, identified via the Product mappings, the architect should refer to the product installation instruction chapters in the related Patterns for e-business series Redbooks.

3.3.4 Micro Design phase

The purpose of the Micro Design phase is to prepare for the build cycle(s) of a specific release of the system. This implies a further detailing of the results obtained in the prior two phases but narrowed down to the scope of the release itself. In this way, the foundation is established for all subsequent implementation related activities.

Figure 3-7  Product mappings for Self-Service::Router

Note: The source for all Product mapping information can be found on the Patterns for e-business Web site at the following URL:

**Refining the architecture**

The main objective of the “Refining the architecture” activity during the Micro Design phase is to complete the design so that the build activities can be performed.

For design guidance related to a particular product, refer to the design and development chapters in Patterns for e-business series Redbooks.

### 3.3.5 Build Cycle phase

The purpose of a Build Cycle phase is to incrementally develop and test part of the system until the objectives of the overall Release, within which the Build cycle is embedded, are achieved.

**Building the production environment**

During this activity, we want to take a look again at the system's topology defined during the earlier phases and leverage this information to build the production environment. The Patterns for e-business series Redbooks can further support building the production environment by referring to the product installation instruction chapters.

### 3.3.6 Deployment phase

The purpose of this phase is to deploy the system and prepare for the next release of the system.

**Reviewing the solution plans**

The purpose of this activity is to complete the systems management and software distribution plans.

This provides the basis for:

- Selecting system management tools.
- Selecting systems management processes.
- Selecting and defining job descriptions, based on identified roles, to support the IT system.

For more information on system management guidelines, refer to the system management processes guideline chapters in Patterns for e-business Redbooks.
3.4 Summary

In this chapter, we have shown how to start from a business case and define a solution on the basis of a single Business pattern. We illustrated this for two different points in time, initially during proposal creation and later on during solution delivery. Each time, we demonstrated how the Patterns for e-business can contribute significant value. The assets of the Patterns for e-business can deliver up to 80% of the proposed solution, and lend themselves very well to integration into an overall solution while at the same time making an important contribution to the overall quality of the solution.
Building solutions on a multiple Business patterns basis

In this chapter, we explore how the Patterns for e-business can contribute to the development of a solution based on multiple Business and Integration patterns. It will be made clear that the Patterns for e-business are not a replacement for any development method in use during solution design or delivery, but are essentially an asset selection technique together with a rich set of associated assets that can be used during the phases/activities of a solution design/delivery project. In order to relate the contribution of the Patterns for e-business to the various phases and activities of solution design (project proposal) and solution delivery, the overall discussion has been framed within a high level description of the overall phase/activity structure of the e-business Custom engagement model of the IBM Global Services Method.
4.1 Introduction

The process of developing e-business applications, based on a comprehensive set of requirements, requires a mature business solution delivery method. This chapter describes the iterative and incremental development method used to build an e-business application from requirements gathering down to deployment. The Patterns for e-business are used to provide reusable assets as we navigate from the problem domain to the solution domain within the development method.

We describe in detail how to build a solution on the basis of multiple Patterns for e-business, illustrating the implementation of a single coarse-grained application associated with one high-level use case.

The context for the discussion of how the Patterns for e-business influence the development of an e-business application is provided by the high level description of the phase/activity structure of the IBM Global Services Method. Throughout this chapter, particular attention is paid to those phases/activities which are most relevant for illustrating the value gained from incorporating the Patterns for e-business into our development approach. A comprehensive business case will be introduced and used as the basis for applying the Patterns for e-business.

As before, we will make a distinction between the use of the Patterns for e-business in a project definition/solution design context and the support it offers during the actual delivery of the project.

4.2 Using the Patterns for e-business during proposal development

Table 4-1 on page 51 gives an overview of some of the activities occurring during the development of a project proposal. These activities can take place in various contexts, such as during the preparation of a proposal linked to a particular RFP (Request for Proposal) or during the definition of a project proposal by an internal customer team. We will focus on the activities for which the assets of the Patterns for e-business are of most value, using ABC Insurance as a case study.
Table 4-1  Proposal development and the IBM Patterns for e-business

<table>
<thead>
<tr>
<th>Proposal Development (Solution Design) activities</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identifying requirements</td>
<td>The navigation of the Patterns for e-business asset catalog starts from a broad categorization of business requirements. Not only do these guide the asset selection process, but they also offer additional insights into the overall business area and the main business drivers.</td>
</tr>
<tr>
<td>Documenting the client environment</td>
<td>The information found in the request for proposal (RFP) or available to the customer team will help to document the current IT environment of the client. This information is key during the later stages of the asset selection process and at the same time creates an opportunity for a focused analysis of the request for proposal or the available documentation.</td>
</tr>
<tr>
<td>Defining the solution</td>
<td>Patterns for e-business contribute significantly to the definition of the solution to be proposed.</td>
</tr>
</tbody>
</table>

4.2.1 Case study for proposal development

We will now discuss each of the activities outlined in Table 4-1 in the context of the ABC Insurance case study.

**Identifying requirements**

In this section, we will introduce the business case for ABC Insurance.

Based on initial discussions with the CIO of ABC Insurance, the project team has developed a high level overview of the solution as follows:

ABC Insurance is an insurance provider, looking to provide electronic document submission capabilities to its independent agent community via the Internet. While ABC Insurance expects the initial volume of electronic transactions to be small as compared to the volumes supported by its traditional business processes, they do believe that offering this infrastructure to their agent community ahead of the competition will provide growth opportunities in the future. ABC Insurance's customers will see this as a speed to market opportunity by reducing the time required to process insurance applications as well as a cost reduction strategy by electronically processing this information.
The solution will provide the following:

- A personalized user/agent experience.
- Electronic insurance application submission.
- Integration with legacy systems for insurance application processing.
- Access to insurance rating and underwriting information.
- Access to insurance application status.
- Electronic premium payment submission.

ABC Insurance is also interested in providing these business functions via several channels, including Web browsers across the Internet and personal digital assistants (PDAs).

**Documenting the client environment**

The key elements characterizing the customer's environment are as follows.

- The functionality will be delivered via a number of existing applications, each with its own authentication procedures. In order to simplify access for the insurance agents, an infrastructure enabling single sign-on will be implemented.
- A preference for Windows 2000/xSeries servers to host the Web infrastructure.
- An installed base of either Windows 2000/xSeries or zSeries.
- Existing back-end applications deployed on zSeries.

**Defining the solution**

Based on the information gathered from ABC Insurance (and summarized in the previous sections), we decide to use the Patterns for e-business for a fast path definition of a suitable and proven solution meeting the business requirements of ABC Insurance. This fast path approach is only expected to provide an 80% fit for the full set of ABC Insurance's requirements so a comprehensive development method will still be needed to customize the selected assets to result in a 100% fit.

These patterns should be considered candidate assets that leverage the experience of architects to create solutions quickly, whether for small local businesses or large multinational enterprises. Specifically in the context of the development of a project proposal, the ability to quickly translate requirements into a coherent and viable solution is extremely valuable. Also, the proven product configurations documented in the Patterns for e-business asset catalog contribute significantly to producing a high quality project proposal on time.
The key elements contributed by the Patterns for e-business are:

- Identification of required functionalities
- Product selection guidance
- Information regarding the interactions between products

For the purposes of the proposal, the following four-step procedure is used to arrive at the recommended solution:

1. Selection of the Business pattern(s):

   An initial analysis of the high-level business requirements described above indicates that the following Business patterns may be applicable to this solution:
   
   - Self-Service business pattern
     
     The Self-Service business pattern is applicable if the requirements suggest that users need to interact directly with legacy data. In this particular case, ABC Insurance is interested in providing access to its existing systems across the Web to its insurance agents.
   
   - Access Integration pattern
     
     The Access Integration pattern describes recurring designs that enable access to one or more Business patterns. In particular, this pattern enables access from multiple channels (devices) and integrates the common services required to support a consistent user interface. In ABC Insurance's case, the pattern is relevant due to the requirement for supporting the agents efficiently in their work by supplying them with a single, consistent and seamless access mechanism to the various applications.

2. Selection of the Application pattern(s):

   The Application pattern focuses on the application level functionality required to support the identified Business pattern(s).

   Based on the available information, the following Application patterns are selected.
   
   - Self-Service::Router application pattern
     
     ABC Insurance needs to make the functionality of a number of its existing backend systems available across a number of different channels (initially only across a Web channel, but a PDA has been identified as a future extension). The Router application pattern provides a structure for applications that require the intelligent routing of requests from multiple delivery channels to one of multiple back end applications.
3. Selection of the Runtime pattern(s):

The Runtime pattern focuses on the technical functionality needed to support an Application pattern.

- **Self-Service::Router runtime pattern**
  
  In this Runtime pattern, the functions of the router tier (the intelligent routing of requests from multiple delivery channels to one of multiple back-end applications) are delivered by an integration server.

- **Access Integration::Web Single Sign-on runtime pattern**
  
  A number of variants exists, each with their own assumptions. Given ABC Insurance's requirements, the applicable variant of this Runtime pattern is the one in which applications rely on the security services of the underlying application server.

4. Obtain the Product mapping:

Given the existing base of Windows 2000/xSeries servers, the corresponding Product mapping is selected.

This Product mapping immediately gives us an overview of the required products and their relationships.

Based on the information obtained from the Patterns for e-business, the proposal can then be further developed by:

- Estimating the mandays needed to build new functionality or to integrate existing functionality
- Estimating the software budget, taking into account among others the suggested software products

**Note:** Other factors are crucial in being able to realistically budget for the proposed solution, like sizing estimates, available skills and other relevant non-functional requirements (availability, performance, etc.), but these are outside the scope of this discussion.

- Specifying the resource profiles required to deliver the solution (among others derived from selected products)
4.2.2 Summary

This section showed how multiple patterns from the Patterns for e-business catalog can be used very effectively in defining (a part of) the solution in response to a request for proposal or in a project definition context. The Patterns for e-business allow us to arrive very quickly at such a solution via an asset selection process starting from an analysis of the main business and IT drivers present in the request for proposal. The obtained results, expressed in terms of required software products, can be used immediately to drive the budgeting aspect of the solution design and will increase the overall technical quality of the proposal given its reliance on the proven software and hardware product combinations found in the Patterns for e-business asset catalog.

4.3 Using the Patterns for e-business during solution delivery

In Table 4-2 on page 56, we take a closer look at the phases and activities of the e-business Custom engagement model. For each of the phases, we identified those activities where the Patterns for e-business can be leveraged. In this context, the Patterns for e-business should not be viewed as a replacement for a method, but as a complementary technique to be used within the context of a method.

Table 4-2 on page 56 provides references to additional Redbooks and the Patterns for e-business Web site to assist in a given activity.
Table 4-2  IBM Global Services Method and IBM Patterns for e-business

<table>
<thead>
<tr>
<th>Solution Delivery Phases</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase: Solution Startup</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Defining the project approach</strong></td>
<td>Starting from the approach outlined in the project proposal, confirm and refine the proposed approach based on any additional information. This is usually done both with the project team and client personnel. The use of the IBM Patterns for e-business will be taken into account during this stage since this will help to shape the overall approach.</td>
</tr>
<tr>
<td><strong>Phase: Solution Outline</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Identifying Requirements</strong></td>
<td>The focus of this activity is to gather the overall business requirements and objectives concentrating on those that will have a significant impact on the solution. One technique which supports getting an overall view of the solution's requirements involves the development of a system context diagram. This diagram represents the proposed solution emphasizing the interactions to be supported with its environment, both in terms of people and/or systems. The Business patterns can provide richness to this diagram by relating it to similar trends in other industries while at the same time allowing for the validation of the selected pattern(s).</td>
</tr>
</tbody>
</table>
### Chapter 4. Building solutions on a multiple Business patterns basis

#### Defining the high level architecture

The main objective of this activity is to get an overall view of the structure and topology of the system to be delivered so that appropriate attention can be given to the more challenging areas of the proposed solution.

Based on the architecturally significant requirements, the architect will validate the business and IT drivers from the client and match these against the ones associated with the patterns. This process will then lead to the identification of the involved Application patterns.

The applicable Application patterns can be documented as part of an architecture overview diagram which would feature, for example, the Router application pattern.

An adopted Application pattern will lead the architect to a specific set of Runtime patterns and Product mappings taking into account the actual IT environment of the customer.

It is very important that at this stage, an accurate assessment be made of any gaps between the identified assets and the actually required solution so that adequate attention can be given to those areas through either the selection of additional products or through custom development.

<table>
<thead>
<tr>
<th>Solution Delivery Phases</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
</table>
| **Defining the high level architecture** | - The main objective of this activity is to get an overall view of the structure and topology of the system to be delivered so that appropriate attention can be given to the more challenging areas of the proposed solution.  
- Based on the architecturally significant requirements, the architect will validate the business and IT drivers from the client and match these against the ones associated with the patterns. This process will then lead to the identification of the involved Application patterns.  
- The applicable Application patterns can be documented as part of an architecture overview diagram which would feature, for example, the Router application pattern.  
- An adopted Application pattern will lead the architect to a specific set of Runtime patterns and Product mappings taking into account the actual IT environment of the customer.  
- It is very important that at this stage, an accurate assessment be made of any gaps between the identified assets and the actually required solution so that adequate attention can be given to those areas through either the selection of additional products or through custom development. |
<p>| <strong>Phase: Macro Design</strong> |  |
| <strong>Identifying requirements</strong> | - The focus of this activity is to gather and refine all applicable requirements (instead of focusing only on the architecturally significant ones) so that the results from the “Identifying requirements” activity performed during the Solution Outline phase can be confirmed and further refined. |</p>
<table>
<thead>
<tr>
<th>Solution Delivery Phases</th>
<th>Added value of the IBM Patterns for e-business</th>
</tr>
</thead>
</table>
| **Defining the architecture** | This activity will focus on specifying the overall architecture, both in terms of how it addresses the functional and non-functional requirements so that in subsequent phases, a start can be made on its implementation. During this activity, the architecture defined during the Solution Outline phase will be confirmed and further refined.  
This time, we will review the patterns selected during the previous phase based on all known requirements. Once the Business patterns have been confirmed, the following steps can be taken:  
1. Finalize the Application patterns to be used.  
2. Select the Runtime pattern for each of the identified Application patterns.  
3. After selecting the Runtime patterns, an experienced architect should integrate these patterns into the overall architecture.  
4. Perform the Product mapping on the basis of the current IT environment of the customer.  
For the selected Runtime patterns, review the Product mappings on the patterns Web site at:  
This information can be used as a guideline for selecting the products in case these have not yet been defined.  
In situations where the client has already predefined an infrastructure, the information on this Web site can be used to validate the decisions that have been made, again based on the previously identified Business, Integration, Composite, Application and Runtime patterns. |
| **Building the development environment** | Review the application development chapters of the applicable pattern redbooks to support the definition of the development environment. Additionally, review product installation instructions in the applicable pattern Redbooks to assist with the product installs for the development environment. |
4.4 Case study for solution delivery

Now we begin the solution delivery for ABC Insurance.

4.4.1 Solution Startup phase

During this phase, we will seek to confirm the overall approach for the project as originally defined in the proposal. An important input to this activity is the information previously made available by ABC Insurance and the actual solution defined during the Project Proposal stage. Particularly relevant for this phase is the information related to the possible use of assets during the engagement.

For the purposes of this section, we will assume that the problem setting introduced in the proposal development section is still valid.
Defining the project approach

The focus of this activity lies in familiarizing the project team with the development method, assessing training and mentoring needs and tailoring the development method to the needs of the project taking the use of assets into account.

An important step in starting any project is to become familiar with any candidate assets that may be of assistance during the development of the solution. Using candidate assets can also improve the profitability of a project as well as lower its risk given that the solution will be based on assets used in previous successful implementations. The candidate assets we are particularly interested in are the Patterns for e-business. Based on the information gathered from the CIO at ABC Insurance, we should be able to determine whether the Patterns for e-business are applicable to this solution.

4.4.2 Solution Outline phase

During the Solution Outline phase, the overall shape and style of the system is decided based upon an analysis of the key requirements. The emphasis during this phase lies much more in identifying all the required functionalities than on exploring each one in detail. The overarching objective is to get an accurate view of the overall effort required to deliver the system. Consequently, particular attention will be paid to those areas deemed to be particularly challenging.

Identifying requirements

Starting from the requirements expressed by ABC Insurance and the way these were interpreted in the project proposal, we will reexamine the customer's requirements in more detail.

If this initial information is not available, then some of the steps normally taken during the project proposal development will be performed at this time, for example identifying the high level requirements.

During this phase of the project, we want to obtain more detailed requirements so that we can identify the actors and key business functions to be delivered by the proposed solution. This information is usually obtained from the high-level use cases; however, for the purposes of this discussion, we will use the high-level business description noted below.

We first define some frequently used terms:

- An actor represents a coherent set of roles. Several users can play the same role and one user can perform several roles. Examples of actors could include a Customer Service Representative (human), and the Credit Authorization Service (external system).
A business function represents a high-level specification extracted from the high-level business requirements. For example, a portal with a personalized UI would be considered a business requirement, and a secured logon would be considered a business function supporting this requirement.

The actors and business functions obtained from the high-level business description will serve as the basis for developing several deliverables during the Solution Outline which will be further refined during the Macro Design phase. The high-level business description for ABC Insurance was developed after a number of work shops with the client IT personnel and the CIO.

To clearly identify the requirements embedded in the following business description, we will underline the actors and the items in bold will represent the business functions.

**ABC Insurance high-level business description**

The ABC Insurance solution will provide a self-service solution for our agents. The solution must support a browser-based user interface (UI) across the Internet. Our future plans are to expand this interface to wireless pervasive devices, such as PDAs. The solution should provide a personalized experience to the agent, at a minimum covering requirements such as a secured logon, and a personal home page. For example, this home page will be customized to a specific agent's requirements, such as pending applications and upcoming renewals.

The ABC Insurance solution will allow agents to submit applications for insurance coverage in an electronic document format. To accomplish this, the solution must interface with the underwriting and rating legacy applications. The solution should provide work in progress capabilities, indicating the status of a submitted application. An alert feature should be included as part of the work in progress feature, prompting the agent for updates or missing information in the application.

The solution should accommodate electronic premium payments for approved applications. Links to the ABC Insurance financial applications will be required to accommodate this feature. ABC Insurance uses First Financial Bank for processing the electronic payments.

Using the high-level business description as a guide, we want to develop a system context diagram. By describing the actors, the system to be delivered and their interactions, a system context diagram helps drive out a precise definition of the scope of the system. Examples of such actors can be service providers, regulatory agencies, financial institutions, etc.

The system context diagram varies from client to client depending on the requirements, the current IT environment and the type of solution to be delivered. For example, the system context diagram for ABC Insurance may look like the one shown in Figure 4-1 where the Web-Enabled Electronic Document Processing Gateway represents the system to be delivered.

![Figure 4-1 ABC Insurance System Context diagram](image)

**Defining the high level architecture**

The main objective of this activity is to get an overall view of the structure and topology of the system to be delivered so that appropriate attention can be paid to the more challenging areas of the proposed solution.
Using the high-level business description as a guide, we develop an architecture overview diagram. Whereas the system context diagram emphasizes how the system to be delivered fits into its environment (in terms of the interactions, it needs to support various actors), the architecture overview diagram (AOD, also known as a Solution Overview Diagram as described in the *Patterns for e-business: A Strategy for Reuse* book) gives an overview of the system that will be delivered, that is, it shows the major building blocks of the solution itself. Such a representation is ideally suited to overlay the Patterns identified thus far, in this case the Business and Integration patterns. In fact, the architecture overview diagram will serve as the basis for depicting all the Patterns that we leverage for developing the solution for ABC Insurance.

The structure of the remainder of this section will reflect the approach followed in determining the patterns applicable to our case study:

- Identifying the actors and business functions
- Connecting the actors and business functions
- Evaluating business and IT drivers
- Identifying applicable Application patterns
- Identifying applicable Runtime patterns
- Integrating the applicable Runtime patterns

**Identifying the actors and business functions**

Using the high-level business description, we develop a visual representation of the actors and business functions shown in Figure 4-2 on page 64. This figure shows both actors (the underlined items taken from the high-level business description above) as well as business functions (the bold items taken from that same description). Existing or legacy applications have been represented with double lines on the box.
Figure 4-2  ABC Insurance actors and business functions

**Connecting the actors and business functions**
Using the high-level business description, we want to link up each business function with either:

- Another business function
- An actor (either an existing system or a human).

The resulting architecture overview diagram is shown in Figure 4-3 on page 65.
Figure 4-3  Architecture overview diagram with business processes

**Note:** Typically, different architecture overview diagrams are produced for different target audiences. For example, in developing a solution where Patterns are not used, the architect may choose a more technical representation of the system to be delivered. In projects where Patterns are leveraged, the architecture overview diagram will take on a more “business view” as is the case within this chapter and demonstrated in the diagram shown above.

**Evaluate business and IT drivers**
The diagrams in Figure 4-2 on page 64 and Figure 4-3 provide the initial structure of the system on which we can begin to overlay the identified Business and Integration patterns. To accomplish this, we must analyze their associated business and IT drivers. The business and IT drivers are a consistent set of objectives that assist the architect in selecting the appropriate Business and Integration patterns. In Figure 4-4 on page 66, we will summarize the Business and IT drivers for the Business and Integration patterns.
The adopted approach which is based on an analysis of the Business and IT drivers, is applicable both to Business and Integration patterns. In both cases, it is based on correctly identifying what the client is trying to achieve. In this case, the high level business description may be used as a starting point and the embedded requirements may then be matched against the business and IT drivers in Figure 4-4 to determine the applicable Patterns for this solution. In other situations where the solution may be more complex or more information is available, it may be necessary to perform more analysis to determine the applicable Patterns.

Based on the information provided in the business scenario, we can quickly determine if any Business or Integration patterns will be applicable to this solution. In a typical project, Composite patterns and Custom designs would also be reviewed as candidate assets.

**Figure 4-4 Business and IT drivers for the Business and Integration patterns**

<table>
<thead>
<tr>
<th>Business and IT Drivers</th>
<th>Business patterns</th>
<th>Integration patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Self-Service</td>
<td>Collaboration</td>
</tr>
<tr>
<td>The end-users and customers need to directly interact with business processes and data.</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>The business process needs to be integrated with existing business systems and information.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>The business processes need to be integrated with processes and information that exists at partner organizations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>The business activity has a need to aggregate, organize and present information from various sources within and outside the organization.</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>The business process must be reachable in a common, consistent and simplified manner through multiple delivery channels.</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>The business activity demands and fosters collaboration and the sharing of information among its participants.</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
We will first revisit the Business patterns and perform a more refined analysis than the one carried out initially at the project proposal stage. Our assessment of relevant patterns runs as follows.

**Business patterns**

Our analysis of the business scenario indicates that the following Business patterns are applicable:

- **Self-Service**
  In this case, ABC Insurance is interested in creating a personalized experience for their customers or agents. The Self-Service business pattern (also known as user-to-business) fits here given that the agent is a user of ABC Insurance’s business systems.

- **Collaboration**
  The Collaboration pattern fits with this business scenario given the requirement for being able to access the insurance application status. This implies an interactive (collaborative) environment between the agent and ABC Insurance personnel.

- **Information Aggregation**
  ABC Insurance is interested in providing rating and underwriting information back to the agent community. This will require product history data to be aggregated and distilled into product research data for each agent.

- **Extended Enterprise**
  ABC Insurance is interested in electronic payment processing. In most cases, this will involve an external payment processing center like a financial institution.

A visual depiction of the applicable Patterns for the ABC Insurance business case is shown in Figure 4-5 on page 68.
Integration patterns

After reviewing the high-level business scenario, it appears that the following integration patterns are applicable for this solution.

- Access Integration

The Access Integration pattern provides for front-end integration of multiple services and information through a common portal. The pattern is responsible for handling multiple client device types, single sign-on, personalization, and providing a common look and feel for the application interfaces. As described in the business scenario, many of these requirements are key to developing the proper solution for ABC Insurance.

- Application Integration

The Application Integration pattern provides for the seamless back-end integration of multiple applications and data without the user accessing them.
directly. The new Web-based tier that will be developed to support this solution will need to access ABC Insurance’s legacy systems and data. As such, this pattern will be important during solution development.

In Figure 4-6, we show the Integration patterns we identified based on our analysis. In this figure, each individual Access Integration and Application Integration pattern is not illustrated. We realize that we need a number of Application Integration patterns, but to keep the diagram simple we do not show these. For readers interested in a more thorough treatment, refer to Patterns for e-business: A Strategy for Reuse by Jonathan Adams, Srinivas Koushik, Guru Vasudeva, George Galambos, ISBN: 1-931182-02-7. We will therefore implement this simplification by using one Business pattern (Product Selection, Self-Service business pattern) and one Access Integration pattern, and combining them.

Figure 4-6 Applying the Integration patterns to the architecture overview diagram
Identifying applicable Application patterns

As noted in Figure 4-5 on page 68 and Figure 4-6 on page 69, we have identified two Self-Service business patterns (focusing only on Product Selection) and one Access Integration pattern. We must now identify the Application patterns for each.

A preparatory approach that can be used is to take a look at the Enterprise Application Integration (EAI) architecture and determine the types of application integration topologies that apply. For example, one topology may suggest a point-to-point application integration architecture while another a hub-and-spoke architecture.

Analyzing the different topologies can be helpful in selecting the correct Application patterns for a given solution. While this chapter does not discuss an EAI-based architecture for ABC Insurance, we can suggest that the solution we are developing is a component of their overall EAI architecture. Given the information we have thus far and after analyzing the architecture overview diagrams in Figure 4-5 on page 68 and Figure 4-6 on page 69, we can see that a hub-and-spoke topology may be more appropriate for this solution.

Point-to-Point suggests either single or multiple access channels accessing a single or common legacy applications. This solution, however, has multiple access channels accessing multiple legacy systems such as, underwriting, rating and financial, thus suggesting that a hub-and-spoke topology may be more appropriate for this solution. Keeping this in mind, we will now take a look at the Business and IT drivers for the Application patterns.

The standard approach to identifying the appropriate Application patterns is to compare the key business requirements gathered so far to the Business and IT drivers for the Self-Service and Access Integration application patterns.

Self-Service application patterns

Business patterns allow us to categorize the interactions between external parties and internal business processes supported by applications and data. Further development now requires that we identify the appropriate Application patterns to support these Business patterns, in this particular case the Self-Service business pattern.

Business and IT Drivers for the Self-Service application patterns

Figure 4-7 on page 71 and Figure 4-8 on page 72 show the existing Self-Service application patterns and the associated Business and IT drivers. For ABC Insurance, we need to determine which Application pattern would fit best based on their requirements. It is important to keep in mind that a hub-and-spoke topology seems to be the best fit for this particular solution. With this in mind, we
will now take a closer look at the business and IT Drivers for these Application patterns to further narrow down the selection.

<table>
<thead>
<tr>
<th>Business Drivers</th>
<th>Stand-Alone Single Channel</th>
<th>Directly Integrated Single Channel</th>
<th>As-Is Host</th>
<th>Customized Presentation to Host</th>
<th>Router</th>
<th>Decomposition</th>
<th>Agent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease the time to market.</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improve the organizational efficiency.</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce the latency of business events.</td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enable easy adaptation during mergers and acquisitions.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Integrate across multiple delivery channels.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Provide a unified customer view across lines of business.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Support effective cross-selling.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Support mass customization.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

*Figure 4-7  Business drivers for the Self-Service application patterns*
One of the primary Business and IT Drivers for ABC Insurance is the ability to integrate across multiple delivery channels, in this case, a browser and pervasive devices. They also are interested in minimizing the complexity of the enterprise and in future growth aspects of this application. ABC Insurance, as part of its EAI strategy, is interested in expanding their business and possibly taking on additional insurance carriers in the future in an attempt to offer a broader range of products to its agent base. Based on these additional requirements, it would seem that the Router, Decomposition and Agent application patterns would be the best fit for ABC Insurance. In addition, these three Application patterns support the hub-and-spoke topology as discussed earlier; each, however, extends this topology by providing additional capabilities. The following is a more in-depth discussion of these Application patterns.

**Router**

The Router application pattern supports multiple delivery channels connecting to one or more back-end legacy applications through a router tier. This router tier can route a single message to one or more applications within the same business process. For example, ABC Insurance is interested in processing insurance applications across a single line of business, in this case let us say Property and Casualty. The router tier can process a single...
request within this business line and access the required legacy systems to produce a response, in this case the rating and underwriting systems.

- **Decomposition**

  The Decomposition application pattern extends the hub-and-spoke architecture provided by the Router application pattern. It decomposes a single, compound request from a client into several, simpler requests and intelligently routes them to multiple back-end applications. Typically, the responses from these multiple backend applications are recomposed into a single response and sent back to the client. This Application pattern is especially useful if the solution is supporting multiple business lines. For example, as noted before, the solution for ABC Insurance addresses the requirements of their Property and Casualty line of business. If they were to expand their business to underwrite Auto and Health insurance policies and they wanted to incorporate these new business lines into this solution, the Decomposition application pattern would be a good fit given that a single request may have to access multiple legacy systems for multiple lines of business. The request would then need to be reconstructed into a single response. As noted in the requirements from the high-level business description, this is currently not the case at ABC Insurance although they do expect to expand to additional lines of business in the near future.

- **Agent**

  The Agent application pattern structures an application design that provides a unified customer-centric view that can be exploited for mass customization of services and for cross-selling purposes. While ABC Insurance does intend to provide a customized view to its agents, they do not yet offer multiple lines of business; therefore, the need to leverage these in a cross-selling capacity is not yet established. The Router application pattern will support the personalization requirement.

In reviewing the additional requirements and the functionality provided by each of the Application patterns, it would appear that the Router application pattern would be the best fit, as well as offer the least complexity for this particular solution. As such, we will use the Router application pattern as the basis for identifying and applying the Runtime patterns and Product mappings.

**Access Integration application patterns**

The Access Integration pattern gives users a single, consistent, and seamless access mechanism to various applications that would otherwise require the use of several different access mechanisms. This Integration pattern is useful when:

- Users need access to multiple applications and information sources without every application requiring its own sign-on to establish a separate security context.
These applications need to be accessed using multiple devices such as fat clients, browsers, voice response units, mobile devices, and PDAs.

A common look and feel is required for all applications.

The user wishes to customize the choice of applications and how they are presented.

We now need to identify the appropriate Application patterns to support the Access Integration pattern.

**Business and IT drivers for the Access Integration application patterns**

The Business and IT Drivers for the Access Integration application patterns are shown in Figure 4-9.

<table>
<thead>
<tr>
<th>Business Drivers</th>
<th>Access Integration Application patterns</th>
<th>Pervasive Device Access</th>
<th>Single Sign-On</th>
<th>Personalized Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide universal access to information and services.</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Provide a single sign-on across multiple applications.</td>
<td></td>
<td></td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Provide role-based access to various applications and data.</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>IT Drivers</th>
<th>Access Integration Application patterns</th>
<th>Pervasive Device Access</th>
<th>Single Sign-On</th>
<th>Personalized Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease the time to market.</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce the total cost of ownership.</td>
<td></td>
<td></td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Reduce the user administration cost.</td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

*Figure 4-9 Business and IT drivers for the Access Integration application patterns*
ABC Insurance is interested in providing multiple channel access to its agent community through a single secure sign-on, as noted in the high level business description. This will allow the agent to access multiple legacy systems for insurance rating and underwriting purposes. ABC Insurance is also interested in providing a personalized view to its agents.

We examine each of the Access Integration application patterns in more detail to determine the best fit for ABC Insurance. They are as follows:

- **Pervasive Device Access application pattern**
  
The Pervasive Device Access application pattern brings a new tier into the architecture. This tier is responsible for the pervasive extensions to the original application. The function of this tier is to convert the HTML issued by the application presentation logic into a format appropriate for the pervasive device. In this way, the Pervasive Device Access application pattern provides a structure for extending the reach of individual applications from browsers and fat clients to pervasive devices such as PDAs and mobile phones.

  This pattern can be leveraged in developing the solution for ABC Insurance. However, ABC Insurance has indicated that using PDAs as a delivery channel is a future requirement and not within scope of the immediate solution. Therefore, we will not include this Access Integration application pattern at this time.

- **Web Single Sign-On application pattern**
  
The primary business driver for choosing this Application pattern is to provide seamless access to multiple applications with a single sign-on while continuing to protect the security of enterprise information and applications. This Application pattern satisfies one of ABC Insurance’s requirements and will be used in our analysis.

- **Extended Single Sign-On application pattern**
  
This Application pattern takes the Single Sign-On application pattern and extends it to include security for the back-end systems. For solutions with strong privacy and/or audit requirements, this approach is needed. The requirements for ABC Insurance do not really dictate such strong security requirements for their back-end systems. As such, this Application pattern will not be used.

**Note:** The primary business driver for choosing the Personalization Delivery application pattern is to increase usability and improve the efficiency of Web applications by tailoring their presentation to the user’s role, interests, habits and/or preferences.
Patterns: Applying Pattern Approaches

▶ Personalized Delivery application pattern

The Personalized Delivery application pattern provides a framework for giving access to applications and information tailored to the interests and roles of a specific user or group. This pattern extends basic user management by collecting rich profile data that can be kept current up to the user's current session. Data collected can be related to application, business, personal, interaction, or access device-specific preferences. ABC Insurance is interested in creating a personalized experience for their agents. These requirements will mainly support the business functions such as, work in progress activities. This Application pattern will be useful given these requirements and therefore will be used in developing the solution.

Our analysis of Access Integration application patterns and ABC Insurance's requirements support us using the Single Sign-On and Personalized Delivery application patterns. Again, the Pervasive Device application pattern is applicable, however, given that it is a future requirement, it will not be discussed further in this redbook.

**Runtime pattern - Self-Service::Router**

In the Router application pattern, the router tier serves as an integration point for delivery channels in the presentation tier, allowing access to multiple back-end applications. In this Runtime pattern, the functions of the router tier are performed by an integration server. Figure 4-10 on page 77 shows a Runtime pattern for Self-Service::Router.
Chapter 4. Building solutions on a multiple Business patterns basis

Each of the nodes are described in detail on the Patterns for e-business Web site. Refer to the following URL for more information:


**Runtime pattern - Access Integration::Web Single Sign-on**

There are two variations of the Runtime pattern for Web Single Sign-On: one where a homogeneous application server is used and the other where a heterogeneous application server is used. The basic difference between these two approaches comes down to which server is performing the user authentication and security checks. In a homogeneous environment, all applications can exploit the application's security server for single sign-on functionality. In the heterogeneous environment, a separate security server is used. This is also used in environments where you want to support single sign-on to multiple back-end platforms.

The mid-tier environment for ABC Insurance will be on a single platform connecting to legacy systems that exist on one platform as well, resulting in a low level of complexity. Therefore, the homogeneous application server approach is appropriate for this solution. The Web Single Sign-On (homogeneous application server) Runtime pattern is shown in Figure 4-11 on page 78.
Runtime pattern - Access Integration::Personalized

There are three variations of this Runtime pattern, as follow:

- Participatory personalization.
  Participatory personalization allows the user to design the content and the layout of the content that they see by explicitly choosing from a selection of options. The personalization service stores the customization results in a profile record.

- Predictive personalization.
  Predictive personalization uses an inference engine to personalize content based on the past history (click stream) of user (all users) behavior. The inference engine may reference a user profile for demographic information to categorize users.

- Prescriptive personalization.
  Prescriptive personalization provides a rules engine that delivers targeted content based on business rules defined by the enterprise. The personalization rules are based on data being requested by the user and the user's profile information.

Given the nature of the information the agents will be requesting (primarily work in progress) and to reduce the overhead on their legacy applications, ABC...
Insurance has indicated that it would like to provide a controlled and consistent look and feel to its agent community. Therefore, the personalization rules will be fixed based on a set of rules developed with the agent community and ABC Insurance. This requirement suggests the use of the Prescriptive personalized runtime pattern for this solution. Figure 4-12 shows this Runtime pattern.

In summary, based on the requirements provided by ABC Insurance and our analysis, we will be applying the following Runtime patterns to the ABC Insurance solution:

- Runtime pattern for the Router application pattern
- Runtime pattern for the homogenous Web Single Sign-On application pattern
- Runtime pattern for prescriptive Personalized application pattern

A combined view of the Single Sign-On and Prescriptive personalized runtime pattern is shown on the Patterns Web site and in Figure 4-13 on page 80.
4.4.3 Macro Design phase

During the Macro Design phase, we begin to develop the complete specification of the architecture in line with the work carried out during the Solution Outline phase. The Macro Design phase also lays the groundwork in preparing for the subsequent releases by developing a robust user interface and architecture capable of withstanding reasonable business change through the delivery of
these releases and beyond. The Patterns for e-business will further support the activities undertaken at this stage.

**Identifying requirements**
Whereas “Identifying requirements” during the Solution Outline phase referred to the activity of determining the key requirements influencing the overall architecture, we will now concentrate on refining the system specification based on all user requirements, business processes and business requirements by elaborating the system requirements and specifications. This will enable us to:

- Make better estimates for the first release
- Provide an overall specification for the structure and topology of the system

This provides an opportunity to update the system context diagram based on any new and/or refined information obtained during this phase.

**Defining the architecture**
Many of the activities in this phase are similar to those carried out during the Solution Outline phase. In this phase, we will focus on specifying the overall architecture, both from a structural and topological point of view so that in a subsequent phase, a start can be made on its implementation. During this activity, confirmation will be sought of the decisions taken during the Solution Outline phase.

This is an opportunity to update the architecture overview diagram(s) based on any new information obtained thus far.

This effectively implies that we will verify during the Macro Design stage that any additional functionalities are catered for either by the products suggested by the Patterns for e-business catalog or that these functionalities will be delivered by other products or earmarked for custom development. Figure 4-14 on page 82 provides an example of how the Patterns for e-business and Product mappings can be leveraged to deliver a product selection for each of the nodes in the runtime model.
Building the development environment

The purpose of “Building the development environment” is to put the hardware and software into place to support the development activities and any associated tools.

The Patterns for e-business Redbooks can also be leveraged in building this development environment. For each of the involved products, identified via the Product mappings, the architect should refer to the product installation instruction chapters in the related Patterns for e-business series Redbooks.

4.4.4 Micro Design phase

The purpose of the Micro Design phase is to prepare for the build cycle(s) of a specific release of the system. This implies a further detailing of the results obtained in the prior two phases but narrowed down to the scope of the release itself. In this way, the foundation is established for all subsequent implementation related activities.
Refining the architecture
The main objective of the “Refining the architecture” activity during the Micro Design phase is to complete the design so that the build activities can be performed.

For design guidance related to a particular product, refer to the design and development chapters in Patterns for e-business series Redbooks.

4.4.5 Build Cycle phase
The purpose of a Build Cycle phase is to incrementally develop and test part of the system until the objectives of the overall Release, within which the build cycle is embedded, are achieved.

Building the production environment
During this activity, we want to take a look again at the system's topology defined during the earlier phases and leverage this information to build the production environment. The Patterns for e-business series Redbooks can further support building the production environment by referring to the product installation instruction chapters.

4.4.6 Deployment phase
The purpose of the phase is to deploy the system and prepare for the next release of the system.

Reviewing the solution plans
The purpose of this activity is to complete the systems management and software distribution plans.

This provides the basis for:
- Selecting system management tools.
- Selecting system management processes.
- Selecting and defining job descriptions, based on identified roles, to support the IT system.

For more information in relation to system management guidelines, refer to the system management guideline chapters in Patterns for e-business series Redbooks.
4.5  Summary

In this chapter, we have shown how to start from a business case and define a solution on the basis of multiple Business patterns. In the case study, a solution was defined, leveraging the Self-Service business pattern and Access Integration pattern. We illustrated this for two different points in time, initially during proposal creation and later on during solution delivery. Each time, we demonstrated how the Patterns for e-business asset catalog was navigated and contributed significant value. The assets of the Patterns for e-business can deliver up to 80% of the proposed solution, and lend themselves very well to integration into an overall solution while at the same time making an important contribution to the overall quality of the solution.
Applying Patterns with existing Custom designs

Sometimes a middleware requirement identifies itself; for example, there could be a need to integrate WebSphere and Domino and WebSphere and SAP. This chapter focuses on these technical solutions and some examples of useful assets that we describe as existing Custom designs.
5.1 Introduction to existing Custom designs

The Patterns for e-business are designed to address the majority of e-business applications an enterprise might need or want to develop. Because most enterprises have similar e-business needs, successful solutions can often be reused. Business, Integration, and Composite patterns provide a certain amount of flexibility in creating varied e-business applications to address minor differences in enterprise needs.

At the time of the writing of this redbook, Patterns for e-business had identified three existing Custom designs that could be exploited as reusable assets. The three existing Custom designs are as follows:

1. WebSphere and Domino Integration
2. WebSphere and SAP Integration
3. WebSphere and Edge Server Integration

Now, let’s look more closely at the individual existing Custom designs and how this type of technical solution may be encountered.

5.1.1 WebSphere and Domino integration

Certain circumstances will, almost automatically, lead to addressing the integration of Domino and WebSphere in a solution under some fairly well understood circumstances.

WebSphere and Domino Integration solutions combine the transactional functionality of the Self-Service business pattern with the collaborative functionality of the Collaboration business pattern. The Self-Service business pattern is commonly observed in e-business solutions that provide users the ability to access their information and change it by interacting directly with core business systems and databases. This pattern captures the essence of direct interactions between users and the enterprise. Such interactions can range from simple static information lookup to complex updates involving enterprise data. The Collaboration business pattern occurs in e-business solutions that involve one or two way interactions between users of the solution.

Examples of applications that use the Self-Service business pattern in combination with the Collaboration business pattern include the following:

- Customer-facing applications, such as an Online Broker application, that allow investors to manage their portfolios and make equity trades across the Web, and also allow investors to collaborate with the broker’s help desk
- Business partner-facing applications, such as a dealer extranet, that allow dealers of a manufacturing company to link their sales distribution operations
to the shop floor processes by exchanging forecast, demand, and production information, and also facilitate online collaboration with the manufacturer’s sales department.

To validate the use of these patterns and the integration between them, we must take a look at the business and IT drivers. These are a consistent set of objectives that assist the architect in selecting the appropriate Business and Integration patterns.

**Business and IT drivers**

Businesses developing a solution and needing the following characteristics should consider using a WebSphere/Domino integration design:

- The end-users and customers need to directly interact with business processes.
- The business process needs to be integrated with existing business systems and information.
- The business process must be reachable in a common, consistent, and simplified manner through multiple delivery channels.
- The business activity demands and fosters collaboration and the sharing of information among its participants.

**Selecting the Patterns**

The Patterns approach for integrating WebSphere and Domino is based on a Custom design that involves the following Patterns shown in Figure 5-1.

![Figure 5-1  WebSphere/Domino Integration as a Custom design](image-url)
As shown in Figure 5-1 on page 87, the WebSphere/Domino Integration Custom design represents multiple different combinations of the Self-Service and Collaboration business patterns, along with the Access and Application Integration patterns. These solutions take advantage of the transactional and collaborative powers of the WebSphere and Domino product lines and address the issues that arise when integrating these servers together in a common e-business application.

To validate that the business problem can be solved by a WebSphere/Domino Custom design, refer to the WebSphere/Domino Integration general design guidelines on the Patterns Web site or to Applying the Patterns for e-business to Domino and WebSphere Scenarios, SG24-6255-00. This redbook is now updated with the newest Domino and WebSphere releases; refer to Patterns: Custom Designs for Domino and WebSphere Integration, SG24-6903.

If it has been determined that the WebSphere/Domino Custom design might provide an appropriate solution design for your business need, you should review the various methods to connect WebSphere and Domino to one another at the Patterns for e-business Web site:


Hybrid Runtime patterns

If you already understand the issues involved when selecting an appropriate connection method for your solution, the next step is to select a hybrid Runtime pattern. The WebSphere/Domino Integration design set includes numerous hybrid Runtime designs, providing solution flexibility to address the specific needs of the business process being automated.

The specific business functionality supported by applications that integrate WebSphere and Domino varies from one industry to another, and for each individual implementation of this type of solution. Patterns architects have performed a somewhat improvised assessment of the various solutions that might be created which combine WebSphere and Domino, and anticipated the most common problems developers would encounter when building these applications, along with solutions that can be used to address these problems.

There are two sets of hybrid Runtime patterns which are WebSphere and Domino release-dependent. This example uses the older hybrid Runtime patterns. For the newest Runtime patterns, refer to Patterns: Custom Designs for Domino and WebSphere Integration, SG24-6903.

Navigating the hybrid Runtime patterns

There are two methods you can use to navigate through the hybrid Runtime patterns. They are as follows:
The first is simply to move through all the Runtime patterns in the linear order in which they are presented on the Patterns for e-business Web site. This method provides an in-depth review of all the WebSphere/Domino Integration designs.

The second is to use the matrix shown in Table 5-1.

If you already have an understanding of the required functionality, complexity, and extensibility of the solution you're designing, using Table 5-1 is recommended. It divides the WebSphere/Domino Integration designs into five categories based on focus of functionality. It then further divides the designs according to the complexity and extensibility of each.

The numbering system used to represent each solution design in Table 5-1 is based upon the chapter and section number where the design is found in the redbook Applying the Patterns for e-business to Domino and WebSphere Scenarios, SG24-6255-00.

Table 5-1 Navigating the hybrid Runtime patterns

<table>
<thead>
<tr>
<th></th>
<th>Entry-Level</th>
<th>More Advanced</th>
<th>More Extensible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration-Centric</td>
<td>3.1.2, 3.1.3</td>
<td>3.1.5</td>
<td>3.1.12, 3.1.14, 8.8</td>
</tr>
<tr>
<td>Transaction-Centric</td>
<td>3.1.4</td>
<td>3.1.5</td>
<td>3.1.13</td>
</tr>
<tr>
<td>Dual Focus</td>
<td>3.1.5</td>
<td>8.1.2.1</td>
<td>3.1.6, 3.1.13, 8.1.2.1</td>
</tr>
<tr>
<td>Collaboration Only</td>
<td>3.1.7, 8.9</td>
<td>3.1.10</td>
<td>3.1.11, 8.3</td>
</tr>
<tr>
<td>Transaction Only</td>
<td>Refer to the</td>
<td>Self-Service</td>
<td>business pattern</td>
</tr>
</tbody>
</table>

For example, a collaboration-centric hybrid Runtime pattern is captured in Figure 5-2 on page 90.
The designs are referred to as "hybrid Runtime patterns" because they show both the middleware nodes commonly seen on a normal Runtime pattern and a graphical representation of the Business and Integration patterns used in combination with one another to create this solution design.

Additionally, because these hybrid Runtime patterns are directly constructed with WebSphere and Domino in mind, the middleware node names are mapped directly to Domino, WebSphere, and related products in the figures, instead of generic node names.

Additional identified hybrid Runtime patterns are as follows:

- WebSphere loaded on a Domino Server (hybrid Runtime pattern 3.1.3)
- WebSphere application with Domino services (hybrid Runtime pattern 3.1.4)
- Single sign-on between Domino and WebSphere (hybrid Runtime pattern 3.1.5)
Chapter 5. Applying Patterns with existing Custom designs

- Using a security server to manage authentication and connections (hybrid Runtime pattern 3.1.6)
- Domino User-to-User (hybrid Runtime pattern 3.1.7)
- Sametime® User-to-User (hybrid Runtime pattern 3.1.8)
- Combined Sametime and Domino (single machine): hybrid Runtime pattern 3.1.9.
- Combined Sametime and Domino (separate machine): hybrid Runtime pattern 3.1.10.
- Sametime and Domino with Policy Director (hybrid Runtime pattern 3.1.11)
- Single sign-on with Sametime, Domino, and WebSphere (hybrid Runtime pattern 3.1.12)
- Combined Sametime, Domino, and WebSphere with Policy Director (hybrid Runtime pattern 3.1.13)
- Domino as a central loosely-coupled broker (hybrid Runtime pattern 3.1.14)
- Combining caching proxy and load balancer (hybrid Runtime pattern 8.1.2.1)
- Using Tivoli® Policy Director as a load balancer (hybrid Runtime pattern 8.3)

For more details on WebSphere and Domino Integration Custom designs, refer to the Patterns for e-business Web site at the following URL:


and the redbook Applying the Patterns for e-business to Domino and WebSphere Scenarios, SG24-6255-00.

5.1.2 WebSphere and SAP integration

The Patterns for e-business designs can be implemented using any software component that fulfills the runtime requirements of the solution, whether those components are IBM products or from a third party vendor. The specific business functionality supported by applications that integrate WebSphere and SAP varies from one industry to another, and for each individual implementation of this type of solution. The designs that follow illustrate solutions that address Self-Service, Extended Enterprise, Application Integration and Electronic Commerce functionality for use by small to mid-sized business, large enterprises, and large enterprise distributor/retailers, respectively.

Selecting the Patterns

Several models have been developed to assist the architect in selecting the correct Runtime patterns for the WebSphere and SAP integration. These models are broken down into the following types of enterprises:
Self-Service designs for small or mid-sized manufacturing companies.

Application Integration and Extended Enterprises designs for large manufacturing enterprises.

Electronic Commerce for large distributor/retailer enterprises.

We will now take a look at each of these development scenarios in further detail.

**Self-Service designs for small and mid-sized manufacturing companies**

In Figure 5-3, the WebSphere/SAP integration Custom design makes use of SAP products in combination with the Self-Service business pattern and the Application Integration pattern for small or mid-sized businesses.

![Figure 5-3](image)

The following criteria are considerations for companies fitting this model:

- The company has finished successful implementation of SAP R/3.
- The company has challenges in running the standard SAP R/3.
- The integration between the outside production and payroll system is done via periodical file transfer and batch input to SAP R/3.
- The company has not planned for a transition to mySAP.com because of complexity and licence cost issues.
- The company wants to open up for the Internet and e-business.

Companies in small and medium businesses often use SAP standard R/3 with the SAP GUI interface and often do not have mySAP.com components installed.
For more information on using SAP products to create Self-Service applications for small to mid-sized manufacturing companies, please review pages 3 through 10 of the PDF presentation located on the Patterns for e-business Web site. Refer to the following URL:


Application integration and extended enterprises designs for large manufacturing enterprises

This WebSphere/SAP Integration Custom design represents multiple different combinations of the following patterns for use by large manufacturing enterprises that are similar to the example criteria for use in Figure 5-4.

![Diagram](http://www-106.ibm.com/developerworks/patterns/sap/select-runtime-topology.html)

Figure 5-4 Application Integration and Extended Enterprises designs for large manufacturing enterprises

An example of applying these Patterns follows:

A holding company wants to have an SAP rollout over all subsidiaries and plans to do this over five years. They have a mix of 390, Unisys and NT applications, but the main legacy systems run on 390. To reduce risk, the company plans to roll out SAP in three waves: first SAP Finance, then SAP Logistics, and third, mySAP.com SCM. In addition, they plan to implement the automotive industry solution.

The company made a detailed analysis of which functions can be migrated to SAP R/3 and found that in total 60% of their business could be handled with SAP R/3. 40% of their business, which consists mainly of the HR payroll system, PPS, CAD, a 390 procurement system and some PC applications, remain outside of the functionality range of SAP.
Additional requirements are to have a common middleware/integration technology to support internal and Internet access needs.

The company today has neither ABAP nor Java skills but wishes to develop both. They recognize that most of their younger employees are more interested in learning Java.

For more information on using SAP products to create Application Integration and Extended Enterprises applications for large manufacturing enterprises, please review pages 11 through 26 of the PDF presentation, located on the Patterns for e-business Web site. Refer to the following URL:


**Electronic commerce for large distributor/retailer enterprises**

This WebSphere/SAP Integration Custom design represents multiple different combinations of the following patterns for use by large distributors and retailers.

![Diagram of Electronic Commerce Patterns](http://www-106.ibm.com/developerworks/patterns/sap/select-runtime-topology.html)

*Figure 5-5  Electronic Commerce large distributor/retailer enterprises*

After successful implementation of SAP R/3, the company wants to implement an Internet front end which shows the latest product information and some CRM functions with the following tasks:

- Share shipping and product availability information with customers.
- Share product prices where special customer arrangements apply.
- Leverage field sales and service access using pervasive services.
- Provide real time order tracking for customers.

In addition, they would like to build up a Web shop for customers. This should include the following:
- A personalized catalog
- Order entry to SAP R/3
- Price, shipping and availability information (same as for CRM)
- Order tracking (same as for CRM)
- Payment via credit card and automatic update of SAP Finance accounts

Since this is essential for the company, it must be available twenty-four hours a day and orders must be accepted regardless of whether the SAP system is available. Orders must not get lost under any circumstances.

For more information on using SAP products to create Electronic Commerce applications for large distributors/retailers such as this, please review pages 27 through 31 of the PDF presentation, located on the Patterns for e-business Web site. Refer to the following URL:


### 5.1.3 WebSphere and Edge Server integration

Many companies will need to address the integration of High Availability and Performance into their e-business solutions. This existing Custom design focuses on Runtime patterns that address the functionality needed to combine WebSphere with High Availability and performance, which leads to WebSphere and Edge Server integration.

Runtime patterns:
- Describe the logical architecture required to implement an Application pattern.
- Depict the major middleware nodes, their roles, and the interfaces between the nodes.
- Address the processing logic and data placed on the middleware nodes.
- Can be represented by a logical node diagram.

Runtime patterns demonstrate Service level characteristics, specifically Non-Functional requirements such as:
- Availability
- Performance
- Scalability
- Security
The focus of this existing Custom design is the available Runtime patterns and their associated Product mappings.

The Runtime patterns are divided into two categories:

- Runtime patterns for High Availability
- Runtime patterns for performance

The concentration is on high availability and high performance guidelines and scenarios as they apply to nodes in the Demilitarized Zone (DMZ) for Runtime patterns and Product mappings. Let us look at some examples of these Runtime and Product mappings.

There are two sets of Product mappings, depending on whether WebSphere V4 or WebSphere V5 is being used. The following descriptions are based on the V4 WebSphere products. For the V5 WebSphere products, refer to the Patterns for e-business Web site at:


**High availability principles**

The basic principles of high availability (HA) are very simple. You must include the possible failure of each component in the architecture of your solution. This will have an impact on your decisions all the way down from the architecture to the design, technology, topology, and products used to build the overall solution.

High availability rules for Runtime environments are as follows:

- Every entity must be redundant.
- Each entity must be monitored for failure.
- A failed entity must not receive any work.

**Runtime patterns for high availability**

Runtime patterns are shown in graphical form using standard node types to identify the function represented by that node. Most patterns will consist of a core set of common nodes, with the addition of one or more nodes unique to that Runtime pattern.

The Runtime patterns for high availability start off with a Base Runtime pattern for the Self-Service::Stand-Alone Single Channel application pattern. This pattern is used as the standard Application pattern for the high availability patterns and variations in order to show the additional nodes you will need for each high availability configuration. From this Base Runtime pattern, four variations for high availability have been identified. For example, Figure 5-6 on page 97 shows the Basic Runtime pattern variation 2: Load balancer hot standby.
Figure 5-6  Basic Runtime pattern variation 2: Load balancer hot standby

This is the standard high availability solution for the load balancer nodes themselves. This Runtime pattern removes the single point of failure from the load balancer node by adding a second node with the same function. The first node will be active, working load balancer. It is the primary load balancer. The second one keeps track of the balancing information and is ready to take over the work of the primary node at any moment. It is the standby load balancer.

Benefits include the following:

- Very simple installation and configuration
- Very short delay for the forwarding task if the MAC forwarding method is used
- High availability and failover for the Web application server nodes
- Horizontal scalability possible by simply adding more servers to the content server load balancer cluster
- High availability and failover provided for the load balancer nodes

Limitations include:

- One server in hot standby mode, not doing any productive work

**Product mapping**

There are two Product mapping options available for the load balancer hot standby configuration.
**Product mapping option 1**

In this Product mapping, shown in Figure 5-7 on page 98, two separate load balancer machines are used to perform the primary and standby load balancer functions.

![Figure 5-7 Load balancer hot standby Product mapping option 1](image)

The Edge Server Load Balancer components keep in constant contact with each other by exchanging a heartbeat between them. This enables the standby load balancer to take over without losing IP packets.

**Product mapping option 2**

The Product mapping shown in Figure 5-8 on page 99 provides a load balancer hot standby configuration without increasing the need for physical machines.
IBM Edge Server allows you to run a backup Load Balancer on one of the Web application server machines. This is referred to as collocation. Collocation of the WebSphere Edge Server Load Balancer component is supported on AIX®, Linux and Solaris platforms.

In this configuration, the backup load balancer node could be affected by problems on the Web Application Server node. In addition, collocation of the backup load balancer function on a content server machine is not supported on all platforms.

The following are a list of defined Runtime patterns for high availability:

- Basic Runtime pattern
- Runtime pattern variation 1: Single load balancer
- Runtime pattern variation 2: Load balancer hot standby
- Runtime pattern variation 3: Mutual high availability
- Runtime pattern variation 4: Wide area load balancing

Performance factors
There are two distinct aspects to performance. One is the minimum amount of time needed to process a given task. This is based on the nature of the task and
the application design. The other is maintaining the amount of time needed for each task if the number of requests for the task increases.

Performance is the result of three factors that interact with each other:

- Time
- Resources
- Workload

**Runtime patterns for performance**

For the Runtime patterns for performance, we start off with one of the Runtime variations from the High Availability Runtime patterns, specifically Runtime pattern variation 2: load balancer hot standby. Refer to Figure 5-6 on page 97 for a graphical representation. Figure 5-9 shows a Runtime pattern for performance, Runtime pattern variation 5: Redirectors.

![Runtime pattern variation 5: Redirectors](image_url)

The Web server redirector node decides whether the request is being served by the local HTTP server or forwarded to the application server nodes. This Runtime pattern moves the application server nodes behind the domain firewall, adding further security.

The Web server redirector node is capable of performing workload management for the requests targeted at the application server nodes in the secure network. In addition, it can perform a port change to match the ports on which the application server nodes are listening. It also takes care of cookie-based server affinity.

This variation has the following benefits:
Each node type (Redirector and Application Server) can be configured to the specific tasks.

- A domain firewall between the two node types adds additional security.
- More flexibility in number of nodes of each type.
- Flexibility to not apply security on certain static content.

This variation has the following disadvantages:

- Many configuration changes on the Application Server node call for a redeployment of the plugin-cfg.xml file to all Web server redirector nodes.
- The configuration of the domain firewall requires additional skills.

The Product mapping for the Runtime pattern variation 5: Redirector is shown in Figure 5-10.

![Diagram of Product mapping, Redirector](image)

The Web server redirector nodes run the IBM HTTP Server with the WebSphere Application Server HTTP plug-in. Again, notice that two redirector nodes are illustrated in Figure 5-10. One redirector node could possibly be sufficient to satisfy all requests. However, high availability considerations recommend using two redirectors with the load balancer spraying requests to both of them.
Following is a list of defined Runtime patterns for Performance:

- Runtime pattern variation 5: Redirectors
- Runtime pattern variation 6: Separation
- Runtime pattern variation 7: Caching proxy

For more detailed information, including technology and security guidelines, refer to the redbook *Patterns for the Edge of the Network*, SG24-6822.

5.2 Summary

These existing custom designs will help you determine the high-level shape of a WebSphere/Domino, WebSphere/SAP, or WebSphere/Edge Server integration solution. By starting with reasonably complete architectures, you save considerable development time and obtain assurance that the end solution will have a much higher chance of success. Actual savings will vary from project to project but reduction of work effort in their design and architecture phases alone is of great benefit.
Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this redbook.

IBM Redbooks

For information on ordering these publications, see “How to get IBM Redbooks” on page 104.

- Access Integration pattern Using WebSphere Portal Server, SG24-6267
- Patterns: Self-Service: Connecting to the Enterprise, SG24-6572
- Applying the Patterns for e-business to Domino and WebSphere Scenarios, SG24-6255
- Mobile Applications with IBM WebSphere Everyplace Access Design and Development, SG24-6259
- Self-Service Patterns using WebSphere Application V4.0, SG24-6175
- Self-Service Applications Using IBM WebSphere V4.0 and MQSeries Integrator, SG24-6160-01
- Patterns: Patterns for the Edge of Network, SG24-6822

Other resources

These publications are also relevant as further information sources:


Referenced Web sites

These Web sites are also relevant as further information sources:

- Patterns for e-business Web site:
- Patterns for e-business Product mappings Web site:
The Federal CIO Council Web site:

Patterns for e-business, WebSphere and Domino Integration Web site:

Patterns for e-business, WebSphere and SAP Integration Web site:

Unified Modeling Language (UML) and Use Case Modeling Web site:
http://www.omg.org

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Glossary

**Actor** A term from Use Case modelling and UML defined by the Object Modelling Group. It is anything, human or otherwise that interacts with a Business Function.

**Application and Runtime pattern alignment** Application and Runtime pattern alignment displays the logical alignment between the application tiers and the supporting (middleware) nodes.

**Application Architecture (Functional Architecture)** Focuses on the application portfolio required to support the mission and information needs of the organization. At the next level of detail, it addresses the common business components and business services that can be leveraged by multiple applications.

**Application data** This represents a logical split of the application data with/without metadata.

**Application pattern** Application patterns represent the logical partitioning of the application logic and data together with the styles of interaction between the logic tiers.

**Application Programming Interface (API)** Defines how programmers use a particular feature provided by an application. As-Is Host application pattern Provides wider intranet access to existing host applications.

**Application tier** A tier is a logical layer within a design that allows the subdivision of the application into major functional collections. Tiers can be further subdivided into functional components.

**Authentication** The process of determining whether someone or something is, in fact, who or what it is declared to be. In private and public computer networks (including the Internet), authentication is commonly done through the use of sign-on passwords. Knowledge of the password is assumed to guarantee that the user is authentic.

**Authorization** The process of giving someone permission to do or have something. A system administrator defines which users are allowed access to the system and what use privileges they are given (such as access to which file directories, hours of access, and amount of allocated storage space). Logically, authorization is preceded by authentication.

**B2B gateway** A B2B gateway manages the interactions between the trading partners within an e-Marketplace based on an executable contract. An example of an executable contract is a Trading Partner Agreement (TPA) - an XML document that defines the general ground rules for such functions as pricing quotations, orders, and acceptances. It also describes the format for the communications that will be used and provides specifics on actions, security, and error handling. When referring to the actions within a TPA, the trading partner is required to implement service interfaces corresponding to these actions. The service interfaces are started by an executable version of the TPA and executed under the application server. Some service implementations require message brokering services to interact with enterprise applications. This can be provided by the Business Protocol Manager or delegated to a dedicated message brokering server.
**Batch**  Batch is an off-line processing environment, usually running at night or the week-end, where long-running and resource-intensive jobs are run. In a data warehouse it is used extensively for data acquisition and propagation.

**BDW (business data warehouse)**  A business data warehouse (BDW) is a data store containing detailed, reconciled, and historical basic business data, structured according to an enterprise data model and designed to be the single, consistent source for all information required for business intelligence purposes. It is guaranteed to be integrated and consistent across the breadth of the business and to cover the span of required history of the business. The business data warehouse is seldom accessed directly by end users and then solely in read-only mode.

**Best Practices**  The design development, deployment and management guidelines for building an application based on a closed set of nested patterns. These guidelines may be generic to a family of middleware products (with some variations), generic to an industry standard set of technologies (with some vendor variations), or specific to a product or product family.

**BI Application Client**  A BI application client is the process, running on user workstation, that provides business intelligence function to the user. Operating in client-server mode, it works with either a BI app server, BDW server or ODS server to provide access to data.

**BI Application Server**  A BI application server is the process, running on an internal node that provides access to data residing in a data mart. Depending on how function is split between the BI app client and the server, the BI app server may range in complexity from simply making database calls to high-function BI processing like online analytical processing (OLAP).

**Binding Application**  Binding applications are used to join B2B interactions with suppliers and buyers to the marketplace commerce functions. They would use a B2B protocol and message formats, which generally are XML messages, like cXML (Commerce XML), to communicate with partners. Operations such as performing an inventory check or obtaining fulfillment information would be initiated by the Commerce and Web app server and flow through these applications out to the partners. Similarly, programmatic requests would flow into the marketplace through these applications, which would interact with the Commerce and Web app server.

**Broker application pattern**  Occurs in designs where one application can access other applications through a set of business services that offer a large degree of independence between the initiating application.

**Browser**  A browser is a workstation-based tool, such as Netscape or Internet Explorer, for accessing the Internet and other resources.

**Business Architecture**  Addresses the business mission, strategy, line of businesses, organization structure, business process models, business functions etc.

**Business Flow Manager**  A Business Flow Manager controls the invocation and interaction of the applications implementing a (major) task in the B2B workflow. In some cases, it simply "is" the business application; interpreting messages and invoking the appropriate back-end system services, potentially through a message router. In more sophisticated implementations, XML scripting might be used to join the various application components needed to complete the a task and allow easy extension and modification of this "micro workflow" implementing the current business process step.
**Business Flow Manager**  The Business Flow Manager controls the business processes used within an organization and the points at which a trading partner’s processing must be integrated with these processes.

**Business Intelligence (BI)**  Business Intelligence (BI) is the gathering, management and analysis of large amounts of data in order to gain insights to drive strategic business decisions, and to support Operational processes with new functions. BI is about the development of information that is conclusive, fact based, and actionable. It includes technology practices like data warehouses, data marts, data mining, text mining, and on-line analytical processing (OLAP). The objective of a BI solution is to transform data into useful information, such as customer profiles, buying habits, product profitability and competitive analysis. It may involve analyzing volumes of data for unsuspected, but valuable, associations and insight. It includes streamlining data into useful reports and sharing that information with people inside and outside the organization who need that information.

**Business pattern**  Business patterns highlight the most commonly observed interactions between Users, Businesses, and Data. They are the fundamental building blocks of most e-business solutions, and describe the interaction between the participants in an e-business solution. The four Business patterns are:
- Self-Service
- Collaboration
- Information Aggregation
- Extended Enterprise

**Business-to-Business**  Business-to-Business (now known as Extended Enterprise business pattern) describes programmatic links both intra-business and inter-business. For example, electronic invoicing.

**Cascading Style Sheets (CSS)**  A simple mechanism for adding presentation style to Web documents

**CICS**  The Customer Information Control System is the world’s leading online transaction monitor.

**Client**  The requesting program in a client/server model. For example, a browser is a client that requests services from a Web server.

**Coarse Grained Application (CGA)**  A collection of major Business Functions identified from the Business Requirements Specification as forming a logical grouping that can be dealt with in the patterns identification process as a single unit.

**Collaboration business pattern**  Can be observed in e-business solutions that allow users to communicate and share data and information with other users or groups of users on the network.

**Collaboration**  Doing business is a series of Collaboration processes. It requires interaction between employees, vendors, suppliers and business partners. While e-mail is one example of an indispensable communication tool used by companies around the world, a number of other collaborative applications are increasingly coming into play. These applications enable local workgroups, or even geographically dispersed teams, to work together using real-time information sharing and distribution across the Internet. The applications include e-mail, group calendaring and scheduling, shared document libraries, discussion databases, newsgroups, and so forth.

**Compensating Transactions**  Used to restore data to a state that existed before the action causing the change (thus reversing the update).
Composite pattern  Composite patterns combine Business patterns and Integration patterns to create complex, advanced e-business applications. Of course, there are numerous potential combinations of Business patterns and Integration patterns, but only a limited number of Composite patterns documented on this Web site. A solution design composed of these multiple building blocks is only considered a Composite pattern when it is recurrently employed to solve the problems of businesses across a wide range of industries. Examples of such Composite patterns include:

- Electronic Commerce
- e-Marketplace
- Portals
- Account Access

Connection  A connection represents the network infrastructure over which interactions between application tiers placed on separate nodes take place. Connections may “carry” one or more interactions, and there may be more than one connection between any two nodes.

Content Management Architecture  Identifies what type of content is required, how it maintained, published, and distributed.

Core System  An application system regarded by an enterprise as vital to its business survival.

Customer Relationship Management (CRM)  Customer Relationship Management (CRM) generally means any effort undertaken to improve customer service. Our definition encompasses a broader vision, based on new approaches for managing customer relationships for competitive advantage and differentiation. Enabled by e-business technology, this approach focuses on managing the customer “holistically,” so you can:

- Provide consistent, value-add experiences through a single, long-running dialog
- Deal with each customer as an individual
- Recall and reference all previous interactions
- Accommodate each customer’s needs and preferences

Customized Presentation to Host application pattern  Used to provide a more user-friendly interface to existing host applications without changing the underlying application.

Data  Data represents a logical split of the application data with/without metadata.

Data Cleansing  Data cleansing is a type of data transformation specialized to detect and remove a number of errors, including format errors and content errors, from data during data acquisition.

Data Mart  A data mart is a data store defined and designed to meet the information needs of a department or group of users. It contains needed data, detailed or summarized, and preferably sourced from the business data warehouse. Data marts are the primary sources of information for users, are optimized to satisfy their query or reporting needs, and are usually used in read-only mode.

Data Mining  Data mining is a method of searching for unexpected patterns and relationships in data using a variety of mathematical techniques and tools

Data Mirroring application pattern  Enables integration of disparate applications by making a read-only copy of the data available to a partner application.

Data Propagation  Data propagation includes the processes, tools, and services responsible for the derivation of data from the business data warehouse into data marts, including the capture or extraction of data from the BDW, its transformation according to predefined rules, and its load or application to the data mart

Data-tier connection  A data-tier connection represents the placement of data relative to the application tiers.
Data Transformation  Data transformation includes any processes used in data acquisition or data propagation, that convert data from one form to another by the application of rules, lookup tables, or combination with other data.

Data Warehouse Services  Data warehouse services include the processes, tools, and services needed to manage and run the data warehouse environment, including archive/restore, security, database management, process management, and so on, but excluding data acquisition and population.

Data Warehouse  A generic term usually used to cover all of the components involved in the provision of business intelligence, from data acquisition to the data marts, as well as the metadata and services elements of business intelligence. It can also be used as a synonym for business data warehouse, or to represent a simple unlayered data warehouse structure.

DB2 (Database2)  The implementation by IBM of the relational database model.

DB2 remote  Local DB2 system that forwards a database (db) request using distributed relational database architecture (DRDA®) to the remote DB2 system for execution.

Decision Support System (DSS)  Decision support system (DSS) is one of a number of older synonyms for applications and data used to support decision-making and business management processes, now broadly called business intelligence systems.

Decomposition application pattern  Extends the hub-and-spoke architecture provided by the Router application pattern. Decomposes a single, compound request from a client in several simple requests and intelligently routes them to multiple back-end applications. Typically, the responses from these multiple back-end applications are recomposed into a single response and sent back to the client.

Delivery Manager  The delivery manager is responsible for routing of information to applications that implement the business processes managed by the business flow manager. Helps to structure a system design that allows a pair of applications to directly communicate with each other.

Directed Collaboration application pattern  Allows users to collaborate with others on the network interactively.

Directly Integrated Single Channel application pattern  Provides a structure for applications that need one or more point-to-point connections with back-end applications, but only need to focus on one delivery channel.

Distributed Component Object Model (DCOM)  A set of Microsoft concepts and program interfaces in which a client program object can request services from server program objects on other computers in a network.

Device Support service  Enables users of a wide range of devices to access the same set of applications.
Digital Certificates  A digital certificate is an electronic credential issued by a trustworthy organization such as a bank, credit union, or large company. The digital certificate vouches for an individual's, business's, or organization's identity and authority to conduct any transaction over the Internet. The issuing organization is called a Certificate Authority, or CA. VeriSign is an example of an existing CA.

Digital certificates address the issue of ensuring that the owner of a public key is really who he claims to be. This technology provides a mechanism to distribute public keys in a special format called a certificate. In addition to the key itself, the certificate contains information about the sender. The whole package is then signed by the issuing CA using its private key. The receiver of the certificate can then verify the CA's digital signature using the CA's public key. Digital Certificates are made available to the public through on-line directories based on X.500 standards.

Digital certificates are defined by the X.509 standard. A X.509 certificate is typically a small file that contains:

- Subject's distinguished name
- Issuer's distinguished name
- Subject's public key
- Issuer's digital signature
- Validity period
- Certificate's serial number

Direct Connection application pattern  Helps to structure a system design that allows a pair of applications to directly communicate with each other.

Directed Collaboration application pattern  Allows users to collaborate with others on the network interactively.

Directly Integrated Single Channel application pattern  Provides a structure for applications that need one or more point-to-point connections with back-end applications, but only need to focus on one delivery channel.

Distributed Component Object Model (DCOM)  A set of Microsoft concepts and program interfaces in which a client program object can request services from server program objects on other computers in a network.

Document Exchange application pattern  Helps to structure the batched electronic exchange of data using mutually agreed message formats.

Domain Name System (DNS)  The DNS assists in determining the physical network address associated with the symbolic address (URL) of the requested information. The Domain Name Server Node provides the technology platform to provide host to IP address mapping, that is, to allow for the translation of names (referred to as URLs) into IP addresses and vice versa.

e-business solutions  Use evolutionary technology and re-engineered business processes to develop revolutionary new applications that are not limited by time, space, organizational boundaries, or territorial borders.

EDI translation package  In its simplest form, an Electronic Data Interchange (EDI) translator converts EDI transaction sets (EDI messages) to and from flat files, into a usable format for an enterprise's applications. The translator can read batches of messages from a VAN mailbox and process them. More sophisticated translation packages convert the message to a request to a transaction processing system. The EDI translator is responsible for mapping to/from EDI standard formats such as X12 or EDIFACT and the communications with the VAN mailbox for sending and receiving documents.
Enterprise Solution Structure (ESS)  Enterprise Solutions Structure (ESS) is a major IBM initiative to establish a standard architectural framework to support creation, reuse, and maintenance of architecture and design assets. These intellectual capital assets are used by IBM services practitioners for developing and delivering enterprise solutions. ESS draws on experiences with building customer solutions to distill “best practice” structures, models, and sample deliverables. The framework provides a rich set of architectural building blocks for solution architects and provides guidance on when and how to use this content to advantage. Specifically, this architecture provides a common, consistent approach for understanding and documenting business requirements via a business model, designing a logical architecture of key components and services, and finally, implementing a physical architecture based on actual products, platforms, and services.

The term “Reference Architecture” is used to refer to the collection of assets, which as a whole describe how to implement a given type of business solution. For example, there is a reference architecture, which shows how to implement a call centre. There is another one, which shows how to implement an online buying application. This site, which provides Patterns for e-business, is based to a large extent upon the ESS reference architecture assets. The intent is to share a summary of those reference architectures with you in this way.

Electronic Commerce Solutions  Allow enterprises to offer products and services to existing and new customers across new channels based on Internet technologies.

Electronic Data Interchange (EDI)  A standard format for exchanging business data. An EDI message contains a string of data elements, each of which represents a singular fact, such as a price, product model number, and so forth, separated by a delimiter. The entire string is called a data segment. One or more data segments framed by a header and trailer form an EDI transaction set.

e-Marketplace  An e-Marketplace consists of a hub that brings multiple buyers together with multiple sellers. Marketplaces provide value to their members by providing a unified view of the set of goods and services traded in the market and by providing a variety of mechanisms to facilitate trade in such products. Many marketplaces feature an aggregated catalog containing product information from multiple suppliers. This catalog can be presented to the user with different views based on the role under which the user accesses the marketplace. Organizations are able to define roles, with authentication, and an approval workflow based upon these roles.

Emerging Pattern  This pattern is considered an emerging pattern, meaning it is based on newer technology that has been tested in the lab, but not necessarily in a commercial environment. Emerging patterns are useful in a situation where you need to use newer technology to solve concerns that proven patterns might not address.

Enterprise Data Model  An enterprise data model is a consistent definition of all the data common to the business, from a high-level business view to a generic logical data design, including links to the physical data designs of individual applications.

Enterprise Resource Planning (ERP)  A full implementation of enterprise resource planning implies a top-to-bottom transformation of the way a company operates, does business, and faces the future. Changes are set in motion in how the company is managed, how it serves customers, and how it reacts to the marketplace. The potential benefits are greater customer satisfaction, reduced cycle time, and increased productivity.

ERP-packaged software covers the primary back office functions of a business. ERP solutions encompass the ERP software plus hardware, database, integration software, technical processes, and people. In this wide perspective, a new information technology infrastructure is part of a large moving picture that can involve reengineering business processes; overhauling the roles, responsibilities, and daily routines of personnel; and implementing application software.
Enterprise-Out Used to represent both an attitude of mind (enterprise-centric) and the consequent extension of existing applications out to a new Web-based access channel. The mindset here is that there is a valuable existing system in place. The company simply wants to add a new access channel to enable users to do business with that system (enhanced as needed) from the Web. In this case there will be very close integration with, and re-use of existing back-end systems, the approach is often referred to as an Enterprise-Out mindset.

ESCON® Channel A communications method between S/390® and other machines.

Executive Information System (EIS) Provides high-level business information (balanced scorecard figures, key indicators, and so on) to upper management or executives. This information is often delivered to the user as a discrete item of work either automatically or on-demand.

Exposed Application application pattern Helps to structure a system design that allows specific applications to be directly accessed by partner systems across organizational boundaries.

Exposed Business Services application pattern Structures a system design that exposes specific services that can be directly invoked by partner systems across organizational boundaries.

Extended Enterprise business pattern Addresses the interactions and collaborations between business processes in separate enterprises.

Extensible Markup Language (XML) A universal format for defining structured documents and data on the Web.

Extensible Stylesheet Language (XSL) A language for creating style sheets. It describes how XML data is to be transformed and formatted before it is presented to a user or passed on to another system.

Extract + (transform) + (load) Also known as ETL. A combination in a single process of extract function, transform function, and any load function required.

Extract + (transform) A combination in a single process of extract function and any transform function required.

Extract The process of reading data from a source database. The data may be extracted as a complete set, a partial set or simply the changes that have occurred over a period of time. Extract from the operational systems is the first phase of data acquisition when populating the BDW, and the first phase of data propagation when populating a data mart from the BDW.

Firewall A hardware/software system that manages the flow of information between the Internet and an organization’s private network. Firewalls can prevent unauthorized Internet users from accessing private networks connected to the Internet, especially intranets, and can block some virus attacks -- as long as those viruses are coming from the Internet. A firewall can separate two or more parts of a local network to control data exchange between departments. Components of firewalls include filters or screens, each of which controls transmission of certain classes of traffic. Firewalls provide the first line of defense for protecting private information, but comprehensive security systems combine firewalls with encryption and other complementary services, such as content filtering and intrusion detection. Firewalls control access from a less trusted network to a more trusted network. Traditional implementations of firewall services include:
  - Screening routers, (the Protocol Firewall)
  - Application gateways (The Domain Firewall)

A pair of Firewall Nodes provides increasing levels of protection at the expense of increasing computing resource requirements. The Protocol Firewall is typically implemented as an IP Router.

Guideline A directing or standardizing principle laid down as a guide to procedure, policy, etc.
GUI  Graphical User Interface

Hardware  Collective term for any computer-related object that can be kicked or battered. Perhaps a better definition needed

HDML  Handheld Device Markup Language is used to format content for Web-enabled mobile phones. HDML is phone.com’s (formerly known as Unwired Planet) proprietary language, which can only be viewed on mobile phones that use phone.com browsers. HDML came before the WAP standard was created. It uses phone.com’s Handheld Device Transport Protocol (HDT), instead of WAP. Phones access HDML sites the following way: Once the URL is typed into the phone, the phone sends the request to phone.com’s UPLink gateway. The gateway sends a HTTP request to the Web server. The Web server returns the page via HTTP back to the phone.com UPLink gateway. The gateway sends the data via HDT to the wireless carrier’s network and down to the phone. HDML and the phone.com gateway are most popular throughout North America. In Europe, WML and the Nokia WAP gateway and browser are the emerging standard. However, some versions of phone.com browsers do interpret basic WML. To serve HDML pages, administrators must add the text/x-hdml mime type to their Web servers.

HOLAP (Hybrid OLAP)  As the name suggest software that uses both ROLAP and MOLAP techniques together to enable multi dimensional representation of data.

HTML (Hyper-Text Markup Language)  A computer language used to write and format pages for Web publication. Incorporates Web features such as hyperlinks, frames, headings, etc.

HTTP (Hyper-Text Transfer Protocol)  The underlying protocol used by the World Wide Web. HTTP defines how messages are formatted and transmitted, and what actions Web servers and browsers should take in response to various commands.

HTTPS  Hyper-Text Transfer Protocol Secure

IBM Global Services  IBM Global Services refers to that organization within IBM that provides professional IT Services and Consulting.

IBM Universal Server Farm  A set of outsourcing sites run by IBM. Server technology from multiple different vendors is operated by IBM on behalf of organizations, which would rather not manage their own server operations. Frequently in Online Buying sites, the nodes in the DMZ front end and the Data Base Server Node are outsourced. These are then networked to the company’s own datacenter for back-end order processing.

IDE  Integrated development environment.

IDL  Interface Definition Language, the language used to define CORBA interfaces.

Identification  The process by which an IT system determines which person or computer process is associated with a request to use IT system resources.

IIOP (Inter-ORB Inter-Operability Protocol)  The protocol used by CORBA applications.

i-mode  The packet-based service for mobile phones offered by Japan’s leader in wireless technology, NTT DoCoMo. Unlike most of the key players in the wireless arena, i-mode eschews WAP and uses a simplified version of HTML, and it uses Compact Wireless Markup Language (CWML) instead of WML.

Information Access-Read-Only application pattern  Helps structure a system design that provides read-only access to aggregated information.

Information Aggregation business pattern  Can be observed in e-business solutions that allow users to access and manipulate data aggregated from multiple sources.
Informational Environment  The informational environment is the systems environment that supports business intelligence and in which the business data warehouse, data marts and supporting infrastructure are built.

Information Architecture (Data Architecture)  Defines what information needs to be made available to accomplish the mission, to whom, and how.

Information Catalog  Includes the logically single, but physically distributed metadata store of the data warehouse, containing all metadata required by business intelligence users in a form suitable for them, as well as the tools to practically use this metadata. The information catalog can also be used by developers and administrators of the warehouse.

Information Portal  An information portal is a user environment on the Internet or intranet bringing together all the tools and data required by a user. It is customizable to appear according to the individual user’s tastes and preferences.

Integration Architecture  Documents the recommended integration approach for front-end and back-end application integration.

Integration pattern  Complex e-business applications can be built by combining multiple Business patterns together. This is accomplished by using Integration patterns as the “glue” between Business patterns. Integration patterns are differentiated from Business patterns in that they do not themselves automate specific business problems. Rather, they are used within Business patterns to support more advanced functions, or to make Composite patterns feasible by allowing the integration of two or more Business patterns. The two Integration patterns are:

- Access Integration
- Application Integration

Intelligent Agent  An advanced software system that is capable of performing tasks on behalf of a user in accordance with predefined roles. This may include selective information retrieval or easier navigation; problem solving, for example, finding faults in networks; and tailoring information for users through multimedia presentation.

Intermediate Data  Any temporary data store used by the extract, transform or load processes.

Internet (or the Net)  A global inter-network of computer networks, connected via Internet Protocol (IP) and the world’s telecommunications infrastructure. IP enables applications such as e-mail, the WWW, file transfer and other services to run across different networks and operating systems.

As of 1999, the Internet has more than 200 million users worldwide, and that number is growing rapidly. More than 100 countries are linked into exchanges of data, news and opinions. Unlike online services, which are centrally controlled, the Internet is decentralized by design. Each Internet computer, called a host, is independent. Its operators can choose which Internet services to use and which local services to make available to the global Internet community. Remarkably, this anarchy by design works exceedingly well.

There are a variety of ways to access the Internet. Most online services, such as IBM.COM, offer access to some Internet services. It is also possible to gain access through a commercial Internet Service Provider (ISP).
Intranet  An intranet is a private network that is contained within an enterprise. It may consist of many interlinked local area networks and also use leased lines in the wide area network. Typically, an intranet includes connections through one or more gateway computers to the outside Internet. The main purpose of an intranet is to share company information and computing resources among employees. An intranet can also be used to facilitate working in groups and for teleconferences. An intranet uses TCP/IP, HTTP, and other Internet protocols and in general looks like a private version of the Internet. With tunnelling, companies can send private messages through the public network, using the public network with special encryption/decryption and other security safeguards to connect one part of their intranet to another. Typically, larger enterprises allow users within their intranet to access the public Internet through firewall servers that have the ability to screen messages in both directions so that company security is maintained. When part of an intranet is made accessible to customers, partners, suppliers, or others outside the company, that part becomes part of an extranet.

IP (Internet Protocol)  Internet Protocol RFC 1812. Part of the TCP/IP family of protocols describing software that tracks Internet addresses, directs outgoing messages, and recognizes incoming messages. Current version is IPv4; next version will be IPv6. Used in gateways to connect networks at a high level.

IP Address  A unique set of digits (e.g., 123.123.12.1) identifying a computer connected to a network, and used by communications programs. Human users communicate through more friendly domain names (e.g., person@company.com.au), which are automatically translated into the IP address.

Defined in the dictionary as - To utter or do a second time or many times; to repeat - refers to a Step or series of Steps in the Patterns identification process that need to be repeated.

Java Foundation Classes  See JFC.

Java IDL  A Java core API providing CORBA/IIOP interface from Java. It complies with OMG standard Java to OMG IDL mapping. See http://java.sun.com/products/jdk/idl/ for more information.

Java Message Service  See JMS.

Java Naming and Directory Interface  See JNDI

Java ORB  An ORB that has been customized to be used from Java, that is it has Java specific bindings (CORBA doesn't support Java bindings). Also applies to an ORB that can be downloaded as an applet and then used for subsequent C-S interactions.

Java Servlets  See Servlets.

Java Transaction API  See JTS.

JavaScript  A browser scripting language originally developed by Netscape and now standardized as ECMAscript by European Computer Manufacturers' Association (ECMA). Microsoft implementation is known as Jscript. Even though contains the word “Java”, it has little resemblance to Java and has a very different purpose and use. Server-side implementations are also available (e.g. from Netscape).

JCE  Java Cryptographic Extension - a Java extension to provide cryptographic services - such as certificate generation, message signing - for application developers. Sun JCE is not exportable outside the US. Australian and other implementations are available

JCL  Job Control Language

JDBC  Java Data Base Connectivity (JDBC) standard provides a standard Java API to access leading vendor databases - using JDBC drivers supplied by vendors or third parties. See http://java.sun.com/jdbc for more information.
**JDK**  Java Development Kit (JDK) consists of the base reference development environment provided by Sun for developing Java applets and applications. It provides a simple Java development environment. For a real-life project, commercial Java IDEs may be used. See [http://java.sun.com/jdk](http://java.sun.com/jdk) for more information.

**JFC**  Java Foundation Classes (JFC) are a second generation GUI Java libraries implementing a consistent look and feel on all operating platforms. Consists of Swing, Pluggable look and feel and other libraries. See [http://java.sun.com/products/jfc/](http://java.sun.com/products/jfc/) for more information.

**JMS**  Java Messaging Services provides a standard API for accessing and providing asynchronous messaging facilities to applications. Leading messaging vendors such as IBM MQSeries®, TIBCO, supports it. See [http://java.sun.com/products/jms/](http://java.sun.com/products/jms/) for more information.

**JNDI**  A standard Java extension API to access and provide directory and naming services. Provides a supplier API using which multitude of directory services such as X500, LDAP, CORBA Naming, DCE naming, Novell Directory Service (NDS) can provide the services. Also provides an accessor API for applications to use the naming and directory services.

**JTS**  Java Transaction Service specifies the implementation of a Transaction Manager, which supports the Java Transaction API. JTS uses the standard CORBA ORB/TS interfaces and Internet Inter-ORB protocol (IIOP) for transaction context propagation between JTS Transaction Managers.

**Knowledge Management**  Knowledge management includes the processes, methodologies, and tools needed to gather, manage, and effectively use knowledge in an organization. Knowledge in this context is defined as a mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information (L. Prusak).

**LDAP (Lightweight Directory Access Protocol)**  Refers to the protocol that is used to communicate from a calling program (running on a node such as a Commerce Server) and a Directory Node. Information is kept on the LDAP-based directory node about such topics as people and/or services. For example, the directory could be used to store information needed to identify registered shoppers (referred to as authentication). It could also be used to store information about what functions those shoppers are allowed to perform after being identified (referred to as authorization).

**Load**  The process of writing data into a target database. The target database may or may not previously exist, and the data to be loaded may be a complete set or simply the changes to be made to the target. Load is the final phase of data acquisition when populating the BDW, and the final phase of data propagation when populating a data mart.

**Load + (extract)**  A combination in a single process of load and any extract function required.

**Logical Node**  A node represents a logical collection of application and middleware functionality. A node is a place where an engineered combination of application and middleware components and data will be placed.
Logical Pattern  A set of conceptual layouts composed of Application patterns and Runtime patterns. The following are logical patterns:

- Application patterns - describe how the application logic and data are partitioned and how they interact.
- Runtime patterns - uses nodes to group functional requirements. The nodes are interconnected to solve a business problem. The choice of Application pattern will typically lead to an underpinning Runtime pattern.

Mail Server  A computer in a network that provides "post office" facilities. It stores incoming mail for distribution to users and forwards outgoing mail through the appropriate channel. The term may refer to just the software that performs this service, which can reside on a machine with other services.

Major Business Function  Functions identified in the Business Requirements Specification as being of primary significance, for example Demand Planning, Auctions.

Managed Collaboration application pattern  Builds on the Directed Collaboration pattern by implementing workflow rules to manage the collaboration between users of the solution.

Managed Process application pattern  Provides support for long-running transactions (or conversations) that underpin many business processes.

Managed Public and Private Processes application pattern  Structures a system design that handles different business protocols with different business partners and maps long-running external transactions to internal business processes and workflow.

Managed Public Processes application pattern  Structures a system design that handles the management of shared business processes between business partners.

Message Oriented Middleware (MOM)  Provides program-to-program communications by message passing. It provides an infrastructure that supports reliable and scalable high-performance distributed application networks.

Management Information System (MIS)  Management information system (MIS) is one of a number of older synonyms for applications and data used to support decision-making and business management processes, now broadly called business intelligence systems.

Mandatory Business pattern  A Business pattern that forms one of the set that are all required in order for an identified set of pattern to match the definition of a Known Composite pattern.

Message Broker  A message broker is built on a queue manager and routes messages to applications. A message broker can provide real-time, intelligent rules-based message routing and dynamic message-content transformation and formatting. In this runtime, the message broker allows multiple applications to implement a published service with the broker providing application integration.

Metadata  Information that describes the meaning and structure of business data, as well as how it is created, accessed, and used. Metadata, warehouse management  Metadata and warehouse management are the set of functions, sometimes combined in a single product, that manage and store metadata and provide basic management function of warehouse infrastructure such as data acquisition and data propagation.

MQSeries  Provides heterogeneous any-to-any connectivity from desktop to mainframe.
MQSeries Integrator Combines a one-to-many connectivity model, plus transformation, intelligent routing, and information flow modeling. It facilitates the development of new application services that integrate the functions of multiple, disparate existing business systems. More information can be found at http://www.ibm.com/software/ts/mqseries/integrator/

MQSeries Workflow Business process management software from IBM. It facilitates the rapid development and management of the business processes that integrate the IT and organizational infrastructure of a company. More information can be found at http://www.ibm.com/software/ts/mqseries/workflow/

Node A node represents a logical collection of application and middleware functionality. A node is a place where an engineered combination of application and middleware components and data will be placed.

ODS (operational data store) An operational data store is a data store containing detailed, partially reconciled, and nearly current data used for immediate reporting needs and sometimes also written to by users.

Online Analytical Processing (OLAP) Online analytical processing is a type of analysis of business data characterized by real-time consolidation and drill-down along many dimensions of large volumes of detailed data, conceptually structured in a multi-dimensional cube.

Open Buying on the Internet (OBI) A proposed standard for business-to-business purchasing on the Internet, aimed particularly at high-volume, low-cost-per-item transactions. More information can be found at http://www.openbuy.org.

Operational Data Operational data is the data managed and controlled by an operational system, and used to run the business at a detailed level, on a second-by-second basis. Such data is usually generated internally, but now often comes from an external source.

Operational Data Store application pattern Allows an application to access a consolidation of multiple data sources, where each source may be updated and controlled by a separate application.

Operational Environment The operational environment is the systems environment that supports the day-to-day operations of running the business and in which the operational systems are built.

Operational System One of the online transaction processing (OLTP) systems of the business that gather and manage the basic business data needed to run the business on a second-to-second basis. The operational system might be a legacy system, a modern Internet-enabled application, or anything in between.

Packages (COTS) COTS (commercial off-the-shelf) describes ready-made products that can easily be obtained. The term is sometimes used in military procurement specifications.

Parallel Sysplex® Refers to the ability of an IBM System/390® hardware environment running MVS™ to operate multiple copies of the system platforms as if they were one large single image.
Partner Middleware Node  One of the central attributes of this approach to business-to-business integration is that the only requirements placed on the partner is to follow the agreements on communications, security, and business protocol, including message formats. The middleware used by the partner is not prescribed in any way and the solution is not dependent on it. This node is a placeholder for any middleware the partner chooses to deploy to assist in implementing the agreements on communications, security, and business protocol. Nevertheless, there are benefits when both partners deploy the same B2B integration nodes, such as automated configuration and version management, and fully synchronize public process execution and recovery.

Pattern  A model for building and a design to copy.

Personalization  The personalization functions define the roles, organizations, and individual players in the e-Marketplace. These roles imply actions that can be performed and data that can be seen. An example of personalization is defining different views of the catalog for different members.

Pervasive Device Access application pattern  Provides a structure for extending the reach of individual applications from browsers and fat clients to pervasive devices such as PDAs and mobile phones.

Physical pattern  A selection of products, which map to a given logical pattern.

Point-to-Point application pattern  Allows users to directly address other users on the network using simple point-to-point synchronous communications, and then enables the users to begin a direct communication link.

Population Crawling and Discovery application pattern  Provides a structure for applications that retrieve and parse documents, and then create an index of relevant documents that match the specified selection criteria.

Population-Multi-Step application pattern  Structures the population of a data-store with structured data that requires extensive reconciliation, transformation, and restructuring.

Population-Single-Step application pattern  Structures the population of a data-store with data that requires minimal transformation and restructuring.

Population-Summarization application pattern  Extends the capabilities provided by the Population-Crawling and Discovery application pattern by attaching summary information to index entries.

Portal Solution  Aggregates multiple information sources and applications to provide a single, seamless, personalized access for its users.

Primary Business Patterns  The four Business patterns identified as the fundamental building blocks of most e-business applications. They are, Self Service, Collaboration, Information Aggregation and Extended Enterprise.

Product mapping  The Product mapping documents all the software platforms and middleware products, but the detailed configurations necessary to deliver the non-functional requirements are not defined.
Proxy Server  Also called a “proxy” or “application level gateway,” it is an application that breaks the connection between sender and receiver. All input is forwarded out a different port, closing a straight path between two networks and preventing unauthorized persons from obtaining internal addresses and details of a private network.

Proxy servers are available for common Internet services; for example, an HTTP proxy is used for Web access, and an SMTP proxy is used for e-mail. Proxies generally employ network address translation (NAT), which presents one organization-wide IP address to the Internet. It funnels all user requests to the Internet and fans responses back out to the appropriate users. Proxies may also cache Web pages, so that the next request can be obtained locally. Proxies are only one tool that can be used to build a firewall.

Programmatic Link  Connection between two or more applications allowing the applications to interoperate.

Prune  Defined in the dictionary as - To remove or take out as superfluous. - the removal of superfluous Business and Integration patterns from the final stages of the pattern identification process.

Public Key Infrastructure (PKI)  A system for verifying the authenticity of each party involved in an Internet transaction, protecting against fraud or sabotage, and for nonrepudiation purposes to help consumers and retailers protect themselves against denial of transactions. Trusted third-party organizations called Certificate Authorities issue digital certificates, attachments to electronic messages that specify key components of the user's identity. During an Internet transaction, signed, encrypted messages are automatically routed to the certificate authority, where the certificates are verified before the transaction can proceed. PKI can be embedded in software applications, or offered as a service or a product. e-business leaders agree that PKIs are critical for transaction security and integrity, and the software industry is moving to adopt open standards for their use.

Purchaser Node  In the e-Marketplace, the purchaser node represents a personal computer that supports a commercial Web browser. It is increasingly common for this node to also be a pervasive computing device capable of displaying content delivered by the e-Marketplace.

The level of browser is expected to support SSL and some level of DHTML. Most online buying applications send a "cookie" to the browser on this node to maintain the shopping session. The cookie contains the session id, which is used to re-establish the conversation between each of the user's interactions with the online buying program.

Queue Manager  Messages are sent to and received from queues that are managed by a queue manager. A queue manager provides a persistent message store and additional services including transaction support and routing of messages to the proper queue. The receiver of a message can be an adapter that transforms the message data into parameters to use on method or procedure calls to a non-queue-based application. Similarly, application adapters can convert information returned from a procedure or method call into a message, which is then sent back to the originator of the request message.

Replicated Database  A copy of a database where changes to both the original and replicated copy have been synchronized so that each contain the same information.

Retail Customer Node  A personal computing device, such as a PC, supporting a commercial browser (for example Netscape Navigator or Internet Explorer). The level of the browser is expected to support SSL and some level of DHTML "cookie" to the browser on this node in order to maintain the shopping session. The cookie will contain a session ID, which can be used to reconnect with a partially filled shopping basket or order and to re-establish the conversation for each interaction.
**Router Node** Used in an application topology to represent the node that links presentation nodes to application nodes. It provides a common interface to multiple back-end applications, facilitating the connection, but containing no business logic to combine the application data.

**Runtime pattern** Defines the logical middleware structure needed to support an Application pattern. It depicts the major middleware nodes, their roles, and the connections between these nodes.

**Search Engine Node** The search engine node responds to user requests to search certain areas, such as the catalog, of the e-Marketplace.

**Security Architecture** Focuses on various aspects of the security and privacy requirements.

**Security Node** This node is a logical representation of the functions needed to manage the security of a system. It works in conjunction with the Directory Node. Think of the directory as the repository that holds:
- Data about security such as user IDs and associated passwords, or digital certificates (used to authenticate a user)
- Lists of services that a user is authorized to perform (authorization or access control)
Think of the security node as holding the set of components that define the decisions to be made. The node may perform the actual security processing; for example, verify certificates. The authentication in most current designs validates the access to the Web Application Server, but it can also authenticate the access to the Database Server. The security domain describes the components needed to implement the technical dimension of security and how these components interact to implement the technical aspects of a security policy. The components that implement security are distributed throughout the network. It's unlikely there's a node in the system that does not include some components implementing some aspect of security. The Security Node represents centralized services that support security on other nodes.

**Self-Service business pattern** Captures the essence of direct interactions between interested parties and a business.

**Sell-Side Hub composite pattern** An e-Marketplace owned by the seller where the seller uses it as a vehicle to sell goods and services to prospective buyers across the Web.

**Server** A process offering some service and either driven by RPC, a session, or a queue. (Gray-Reuter). In the context of X-Windows, a graphics application that controls screen presentation according to messages from a client application.

**Shared Database** A single database that is shared across multiple transactional Web servers.

**Shared File Server Node** The timely synchronization of several Web servers is achieved by using a shared file system as the content storage and capitalizing on the replication capability of this technology.

**Single Sign-On application pattern** Provides a structure for integrating several applications under a portal that provides single sign-on capability and role-based access to certain information and applications.

**Stand-Alone Single-Channel application pattern** Provides a structure for applications that have no current need for integration with other systems and need only focus on one delivery channel.

**Store and Retrieve application pattern** Allows users to collaborate with others on the network interactively whether the communicating partners are online simultaneously or not.

**SMTP** Simple Mail Transfer Protocol
**SOAP**  Simple Object Access Protocol provides a way for applications to communicate with each other over the Internet, independent of platform. Unlike DCOM's IIOP, SOAP piggybacks a DOM onto HTTP (port 80) in order to penetrate server firewalls, which are usually configured to accept port 80 and port 21 (FTP) requests. SOAP relies on XML to define the format of the information and then adds the necessary HTTP headers to send it. SOAP was developed by Microsoft, DevelopMentor, and Userland Software and has been proposed to the Internet Engineering Task Force (IETF) as a standard. For more information go to: [http://www.develop.com/soap/soapfaq.htm](http://www.develop.com/soap/soapfaq.htm)

**Solaris**  Solaris refers to the operating system that controls many of the machines provided by Sun Microsystems Corp.

**Solution Overview Diagram**  A graphic representation of the Actors, Business Functions and Interactions between them identified from a Business Requirements Specification.

**Source Data**  Source data is the data store from which the extract process reads its input data. It is a generic term representing either operational data, BDW, data mart, ODS or information catalog when they are being read from.

**SQL**  A standard interactive and programming language for getting information from and updating a database. Although SQL is both an ANSI and ISO standard, many database products support SQL with proprietary extensions to the standard language. Queries take the form of a command language that lets the user select, insert, update, and find out the location of data and so forth. There is also a programming interface.

**SSL**  Secure Sockets Layer (SSL) refers to encryption technology, which is commonly used between the browser on a user's PC and a Web Server Node. It is used to protect the data in messages from being viewed in an un-authorized fashion while travelling over a TCP/IP network. It can also continue to protect the messages as they flow over internal TCP/IP networks between nodes after passing the Web server.

**Supply Chain Management (SCM)**  A supply chain is the way an enterprise ties together internally and externally the people, processes and related information associated with its flow of goods. Supply chain management is a strategic approach that unites all steps in the cycle, from initial product design and the procurement of raw materials through production, shipping, distribution, and warehousing, until a finished product is delivered to a customer.

**Synchronous**  In the context of system modes of interaction: the interaction is consecutive or serial with involved components being active at the same time. That is, components issue a request and wait for something to happen.

**System**  The computer based parts of one or more applications including data and infrastructure.

**Systems Integrator**  Company or person(s) responsible for the integration of purchased systems (often including hardware and software) into an existing IT environment.

**Systems Management Architecture**  Defines the approach for monitoring, administration, and management of the applications and the infrastructure.
**Systems Management Node**  This node is a logical representation of the functions required to manage all the nodes and components in the system, including the management of problems, changes, performance, configuration of assets, and others. There are usually two aspects to systems management:

- A managing aspect (with server components running on one or more systems management servers)
- A managed aspect (with systems management client components running on every node in the system)

There should be client components running on every node, which is able to accept and install changes sent from a change management server. The changes may be either pulled from the client on demand, or pushed from the server with centralized control. On critical nodes, there may also be problem management components that send a "heartbeat" back to a central monitoring site. If a heartbeat is missed, the managing site raises an alert.

**Target Data**  The data store to which the load process writes its output data. It is a generic term representing either BDW, data mart, ODS or information catalog when they are being written to.

**TCP**  Transmission Control Protocol

**TCP/IP**  Transmission Control Protocol / Internet Protocol

**Technology Architecture**  Defines the technology services needed to support the application portfolio of the business. It also documents the software, hardware, and network product standards.

**Tier**  A logical layer within a design that allows the subdivision of the application into major functional collections. Tiers can be further subdivided into functional components.

**Tier-to-tier connection and label**  A connection between two tiers indicates that a programmatic interaction takes place between the two tiers. It is labeled synchronous or asynchronous to indicate whether the programmatic interaction between the adjacent tiers takes place synchronously or asynchronously.

**Thin Client Transactional pattern**  The Enterprise Solution Structure (ESS) technical architecture that addresses the need to do enterprise-scale administrative business, as opposed to solutions requiring real-time control of equipment. For example, Customer sales and service, and Order processing, Claims processing, loan origination, and so on. Its purpose is to support the business need of doing enterprise-scale commerce (as contrasted with business intelligence or collaboration) over the Web or via network-connected workstations. The essence of this pattern is the need to use highly secure, highly scalable transaction processing via this new channel.

**Transaction**  An exchange, often between two computers, involving a request for information or the execution of a function and the response to the request. Also see **Unit of Work**

**Transactional Workflow Manager**  Primarily concerned with driving a sequence of system-level transactions that constitute some higher level (business) process or task. A transaction workflow manager focuses on process logic, including any error related corrective or compensatory action, but may also include functionality to provide direct transaction coordination (such as two-phase commit) across attached cooperating systems.

**Transcoding**  Bridges data across multiple formats, markup languages, and devices. In addition, it adapts, reformats, and filters content to make it suitable for pervasive devices. Products such as WebSphere Transcoding Publisher implement this technology. More information can be found at [http://www.ibm.com/software/Webservers/transcoding/](http://www.ibm.com/software/Webservers/transcoding/)
Transform  Includes any processes used in data acquisition or data propagation that convert data from one form to another by the application of rules, lookup tables, or combination with other data.

Transform + (load)  A combination in a single process of any transform function required and load function.

Two-phase commit  A protocol that allows a set of autonomous processes or agents eventually all to commit or all to abort a particular transaction or set of transactions. Most transaction managers offer to act as the coordinator in a two-phase commit protocol. Variants of the protocol are found in LU6.2 and OSI-TP.

UML  The Unified Modeling Language (UML) is the industry-standard language for specifying, visualizing, constructing, and documenting the artefacts of software systems. The UML notation is an evolution from older OO notations, now endorsed as a standard for OO modelling development by the Object Management Group (OMG).

Unit of Work  A transaction is a recoverable unit of work, or a group of SQL statements that can be treated as one atomic operation. This means that all the operations within the group are guaranteed to be completed (committed) or undone (rolled back) as if they were a single operation. A transaction can also be referred to as a Unit of Work or a Logical Unit of Work. When the transaction spans multiple connections, it is referred to as a Distributed Unit of Work.

A single unit of work refers to the (one or more) SQL COMMITs for create, update or delete, for a single business transaction that must be applied to multiple tables, distributed relational databases, etc. and that are done in conformance with the ACID properties of transaction semantic integrity; that is, atomicity, consistency, isolation and durability.

UNIX  The multi-user, multitasking operating system developed at Bell Labs in the early 1970s

User Experience  Identifies the different user groups and their user experience needs. Also defines enterprise-wide presentation standards.

User Facing  An application system that directly interfaces with the end user.

User-to-Business pattern  Now known as the Self-Service business pattern, it is the general case of users (internal to the enterprise or external) interacting with enterprise transactions and data. It is relevant to those enterprises that deal with goods and services not normally listed in and sold from a catalog. It covers all user-to-business interactions not covered by the User-to-Online Buying pattern. This Business pattern also covers the more complex case where there is a need to access back-end applications and data.

User-to-Data pattern  Now known as Information Aggregation business pattern, encompasses the provision of Business Intelligence (BI) capabilities to an organization. The user is someone connected to the data through one of four paths:
- Internet: the user is external to the company, or an agent of the company.
- Intranet: a staff (internal) user.
- Extranet or privileged Internet: an associate of the client's organization who acts as a business agent on the company's behalf.
- Fat client-connected as in a client-server system: applies to internal users only.

The data can be held in:
- Web-content store: holding Web pages and cached information. The data may include copies of operational detailed records, such as consolidated account information for a customer reference. The data is read-only; if an update of the data is required, the pattern is User-Business, not User-Data.
- Data mart: the data may be read-write with local scope-of-effect only.
- Data warehouse: the data is read-only for applications.
- Tool-specific store (proprietary): some tools, such as Essbase, require specialized data stores for efficiency.
**User-to-Online Buying pattern**  The special case (now part of Self-Service business pattern) where products are sold through a catalog using a shopping cart, a wallet, and so forth. This business pattern can also include links to back-end systems to allow for inventory updates and credit checking. Examples of the User-to-Online Buying pattern:

- Consumers purchasing goods online
- Buyers purchasing goods online from a supplier

**User-to-User pattern**  Now known as the Collaboration business pattern, it describes users collaborating with one another by e-mail, shared documents, and so forth. For example, collaborating across teams on document development.

**Value Added Network**  A VAN is a networking service that leases communication lines to subscribers and adds extra services or capability such as security, error detection, guaranteed message delivery, and a message buffer.

**VPN end point**  A Virtual Private Network (VPN) is an extension of an enterprise's private intranet across the Internet or other public network. It creates a secure private "tunnel" through the Internet to the other partner. Here, we show its access point in the DMZ, although you can also create configurations that access the VPN from behind the domain firewall.

**WAN**  Wide Area Network

**WAP (Wireless Application Protocol)**  A standard for providing cellular phones, pagers and other handheld devices with secure access to e-mail and text-based Web pages. Introduced in 1997 by Phone.com (now Openwave Systems), Ericsson, Motorola and Nokia.

WAP provides a complete environment for wireless applications that includes a wireless counterpart of TCP/IP and a framework for telephony integration such as call control and phone book access.

WAP features the Wireless Markup Language (WML), which was derived from Phone.com's HDML and is a streamlined version of HTML for small screen displays. It also uses WMLScript, a compact JavaScript-like language that runs in limited memory.

WAP also supports handheld input methods such as a keypad and voice recognition. Independent of the air interface,

WAP runs over all the major wireless networks in place now and in the future. It is also device independent, requiring only a minimum functionality in the unit so that it can be used with a myriad of phones and handheld devices.

**Web Application Server Node**  A Web application server node is an application server that includes an HTTP server (also known as a Web server) and is typically designed for access by HTTP clients and to host both presentation and business logic.

The Web application server node is a functional extension of the informational (publishing-based) Web server. It provides the technology platform and contains the components to support access to both public and user specific information by users employing Web browser technology. For the latter, the node provides robust services to allow users to communicate with shared applications and databases. In this way, it acts as an interface to business functions, such as banking, lending, and HR systems.

**Web Mart**  A Web mart is a data mart designed for user access through a Web browser and optional plug-ins. Data in the Web mart is stored in a standard Internet format such as HTML, and resides on a server in the DMZ.
**Web Server** A process that supports the use and management of Web pages and other Internet-related material.

**WebSphere Application Server** Provides an e-business application runtime environment based on open standards. More information can be found at http://www.ibm.com/software/webservers/appserv/

**WebSphere Business Integrator** Enables you to seamlessly span the gap between your own enterprise computing systems and those of your customers, suppliers, business partners, and marketplaces simultaneously. More information can be found at http://www.ibm.com/software/webservers/btobintegurator/

**WebSphere Everyplace® Suite** A comprehensive, integrated software platform for extending the reach of e-business applications, enterprise data, and Internet content into the realm of pervasive computing. More information can be found at http://www.ibm.com/pvc/products/wes/

**WebSphere Partner Agreement Manager** Enables multiple partners to participate in shared business processes that can be partially or fully integrated depending, on business needs. More information can be found at http://www.ibm.com/software/webservers/pam/

**WML** Wireless Markup Language is an XML language used to specify content and user interface for WAP devices; the WAP forum provides a DTD for WML. WML is supported by almost every mobile phone browser around the world. WML pages are requested and served in the same way as HDML pages. For Web servers to serve WML pages, they must contain the text/vnd.wap.wml mime type.

**WebSphere Translation Server** A machine-translation offering that can help companies remove language as a barrier to global communication and e-commerce. More information can be found at http://www.ibm.com/software/speech/enterprise/ep_8.html

**Workflow** An emerging concept that centres on the problem of tracking and managing work in a team environment. Workflow is a manual or automated approach for routing this work from one individual to another.

**Workflow Manager** A workflow manager provides model-driven business process automation and tracking, involving systems or systems and people. These processes can span multiple applications and organizational boundaries. A workflow manager maintains state and tracks sequencing through the business process to guide what the application or user does with a message as it arrives.

**Workflow Server Node** The function of the workflow server node is to manage the flow of operations for users and applications within the e-Marketplace. The scope of workflow management is categorized into the groups macro and micro. Macro - At the macro level, the workflow server manages functions at a broad level, such as governing a complete business process. Micro - At the micro level, the workflow server manages lower-level tasks, such as the flow of user interaction associated with an online product purchase.

**XML** See Extensible Markup Language

**XSL** See Extensible Stylesheet language

**Zone** Represents an area for which a common set of non-functional requirements can be defined.
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Patterns: Applying Pattern Approaches
Patterns for e-business Series

Applying Patterns for e-business effectively

Integrating pattern approaches within a methodology

Technical scenarios validated with case studies

IBM Patterns for e-business provide the robustness needed to instantiate reusable architectural templates to solve eighty percent of recurring business problems, where robustness is defined as the minimal degree of changes to a design (architecture or component) to adapt to a change in business requirements.

The focus of this IBM Redbook is on documenting the currently observed usages of the Patterns for e-business. This redbook is part of the Patterns for e-business series. We introduce three identified pattern approaches and examine pattern scenarios for each of them. The three pattern approaches are:

- Approach 1 - Building solutions on the basis of a Single Business pattern
- Approach 2 - Building solutions on the basis of Multiple Business patterns
- Approach 3 - Applying Patterns with existing Custom designs

We examine Application patterns, Runtime patterns and Product mappings to implement a Custom design. We also document the alignment of these approaches with an IBM Global Services Method.

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