eCube Systems
Enabling Enterprise Evolution

Evolving Legacy Entera Systems: A White Paper

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1. Introduction

IT managers are facing a variety of business pressures that are forcing them to evaluate the modernization of legacy systems. Business requirements for lower operational costs, better performance, reduced risk and compliance with industry and corporate standards are driving this process.

As managers consider their need to support development standards like Java, run applications on up-to-date hardware platforms, integrate with contemporary architectures, and support enterprise protocols they must evaluate legacy systems built on Entera and possible modernization targets.

eCube Systems provides a modernization process based on the evolution of existing business logic with the addition of contemporary platform, architecture, language and protocol support. Enterprise application evolution enables companies to extend the value of existing business logic by defending it from "software hardening" the growing inflexibility of legacy systems.

2. Evolutionary Goals

This white paper outlines how companies can extract the greatest value from their investments in Entera by using eCube's Enterprise Evolution products to evolve their distributed business logic to contemporary architectures such J2EE, .NET and Web services.

This evolutionary process is designed so that companies can avoid costly re-engineering, re-testing and re-deploying of replacement systems. At the same time, Enterprise Evolution enables applications to remove their dependency on Entera.

Reducing Cost and Extending Value

This document is not designed to provide readers with an in-depth review of the financial rational for seeing Enterprise Evolution as a strategic option (please see blank for more information). However, it should be noted that many companies have realized hundreds of thousands of dollars in saving by evolving legacy business logic. By eliminating the cost of hosting legacy applications on non-supported operating systems and databases one customer saved $30,000 a month.

Improve business and technical flexibility

The nature of business is dynamic. Change is a constant consideration for both business and IT managers. In order for systems to truly meet today's rapidly changing business needs, it's imperative that they support a wide range of platforms, languages and architectures. They must be able to cross the enterprise, the Internet and a variety of protocols.

NXTera and **NXTware EV** are two Enterprise Evolution products from eCube Systems that address the dynamic nature of business and enable legacy applications to support contemporary operating systems and databases, while enabling legacy business logic to be accessed via .NET, J2EE and Web services.

We'll outline in this paper the steps Entera user can take to evolve their existing applications and extend the value of their investments.

3. **Evolutionary Process - Renewal**

Renew

Old applications running on unsupported platforms are expensive to maintain and add complexity to data center management. So the first stage of the evolutionary process is renewal. In this stage existing Entera applications are updated so that they can run on lower cost contemporary operating systems and database platforms.

NXTera Benefits

NXTera is eCube's contemporary evolution of the Entera platform. It is designed to provide operational update to legacy Entera applications. NXTera delivers improvements in performance, operating system and database support.

NXTera benefits from eCube's deep understanding of Entera internals. Based on that understanding and customer feedback, eCube has identified the functionality, performance and support issues that place greatest limits on Entera's usability and extensibility. With this information, eCube was able to re-engineer and improve targeted portions of the base Entera platform. These changes, implemented in NXTera, range from ports to new platforms, to simple bug fixes, from adding new data handling features, to the complete re-engineering of some modules.   The following review the most important changes made to the legacy code base inn NXTera:

Data Handling and Manipulation

eCube's engineers completely re-engineered NXTera Data access, transport and parsing modules for Oracle, Sybase and DB2. The outcome was more pro-formant and flexible data access that ready to meet today's high throughput requirements. Some user saw a 42% increase in data-centric processing.

Memory Management

Over time application usage has away of increasing and exceeding original expectations. Mergers, regulatory changes and increased usage can place stress on legacy systems and their managers. NXTera has addressed these performance issues by re-engineering memory management and the hash table architecture of the NXTera/Entera runtime.

The combined benefits of the work described below can be seen in these results derived NXTera /Entera comparative tests performed by multiple customers.

■ 35% performance increase in memory intensive tasks

■ 25% performance Increase when handling large datasets

■ 45% performance increase when handling many small datasets

NXTera Implementation

NXTera is source code compatible with Entera, that means individual portions for an existing Entera infrastructure may be updated independently of others. For instance, the data access portion of a system can be updated with out changing the client or server runtimes. (See Figure 1:) The same is true when a user decides to update the server runtime and data access portion and not change the client.

However, even when the client needs to be updated NXTera provides simple source code upgrades that lower the cost of updating these systems. The system usually only requires an installation, recompilation and distribution.

Here is a list of newly supported platforms for the client, server and data implementations and the source files that have been modified:

Client Support and File Modifications

- Windows XP, XP Professional, Windows 2000

- PowerBuilder 9 and VB

    o Updated oden40.dll, Updated odet40.dll

Server Support and File Modifications

- Latest Versions of: HP, SUN, IBM, LINUX, Windows, SGI

    o Updated rpcdebug, obigen, Updated broker

Server Support and File Modifications

- Oracle 9i, DB2 V7 and 8.x, Sybase 12.x, Informix, MS SQL, MY SQL

    o Updated ora_start, Syb_start, ifx_start

Renewal Topology: Entera with NXTera 5

The figures below outline the architecture of a legacy Entera and the updated topology of a system upgrade to NXTera 5. (*See Appendix A for Files update in NXTware.*)
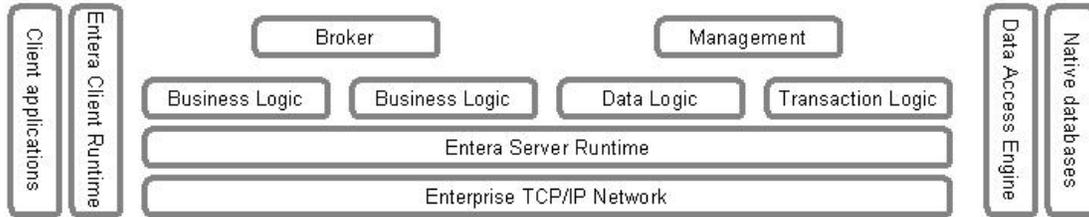

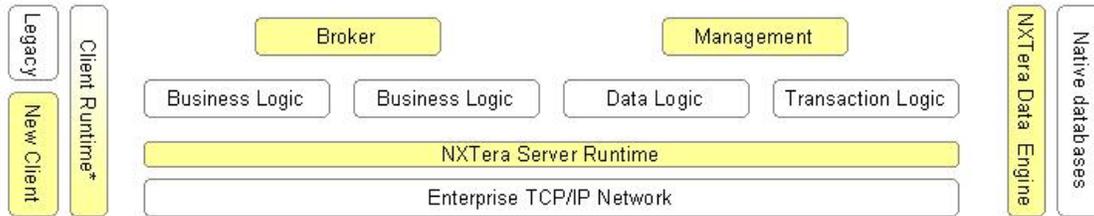**Figure 1: Entera Topology**

Figure 2: NXTera Updated Architecture

4. Evolutionary Process - Evolution

Evolution provides for the modernization of existing Entera (NXTera) business logic. During the first stage, legacy systems are enabled to support and interoperate with contemporary transports, protocols, language bindings and frameworks. During the second phase, the last vestiges of the legacy Entera system, legacy platform and/or legacy development language are dropped and converted to contemporary equivalents (E.G.: COBOL/C replaced with JAVA).

The rest of this paper's focus is on the first phase of the evolutionary process. The second phase is described in a subsequent white paper. (*Evolving Generic Legacy Systems to Contemporary Platforms.*)

Evolution Phase: NXTware Evolution Server

eCube's NXTware EV (Evolution Server) enables existing business logic developed in Entera and other legacy systems to interact, leverage and integrate with contemporary distributed service platforms, protocols and applications. Through a combination of emulation, new architectures and advanced provider/consumer support, NXTware EV allows companies to extend the value of their existing technology investments.

NXTware EV, applies industry standards and a deep understanding of legacy systems to enable the evolution of existing business logic to contemporary platforms. What follows is a list of benefits and industry standards available in NXTware EV, as well as a discussion of its architecture and product features.

NXTware Evolution Server Platform

NXTware is a lightweight evolution platform built in entirely in Java. It takes advantage of open industry standards to enable legacy systems to generate XML and participate in contemporary architectures such as .NET, J2EE, and Web Services.

Development Environment

NXTware based applications can be developed and configured using any Java development environment. Development is done using industry standards for Java, XML and SQL programming.

Integration Capabilities with JCA

NXTware is compliant with J2EE Connector Architecture (JCA) This allows legacy systems to act as J2EE resources, with NXTware EV acting as a Resource adapter.

The J2EE Connector architecture defines a standard architecture for connecting the J2EE platform to heterogeneous legacy systems. Examples of legacy systems include ERP, mainframe transaction processing, database systems, and legacy applications not written in the Java programming language such as Entera. By defining a set of scalable, secure, and transactional mechanisms, NXTware using the J2EE Connector architecture enables the integration of legacy applications with application servers and enterprise applications.

Integration Capabilities with XML

NXTware EV makes all legacy Entera/NXTera data, transaction, business logic server capable of responding to requests for responses in XML format. NXTware provide a away to generate XML based business documents from legacy systems. NXTware provides a uniform XML interface representation despite different implementation technologies such as Entera, RPC, DCE and others. Future versions will allow users to optionally downloading XML schemas for operational use and response formatting and will also translate messages into corresponding Entera and legacy internal calls whenever required. In addition, NXTware extends business scenarios across firewalls enabling secure flow of business documents without requiring changes to establish security infrastructures.

NXTware Cross-Architecture Integration

NXTware EV supports a variety of integration models and standards to allow user the greatest amount of flexibility. They include:

- As a Consumer
    - Of EJB functions
    - Of XML
- As a Provider
    - To EJB servers and clients function
    - To .NET clients
    - Of XML
    - To HTTP/Browser
        - JSP/Servlet
- Integration Architectures and Targets
    - JCA
    - CICS
    - Open VMS (via SOAP)
    - Commercial ERP's (via JCA)
    - Multiple protocol support
        - RPC, DCE, IIOP, SOAP

Multi-language Binding

NXTware support a large number of client bindings and support for a variety of development platforms. Below follows a shot list of contemporary development tools, environments and languages.
    - J2EE, .NET and Servlet development environments
    - Multiple language binding: Java, .C#, J#, C++, 4GLs, etc

Emulation features

NXTware can fully emulate Entera, DCE and other RPC-based distributed systems. This allows NXTware to be easily added to existing legacy systems as a replacement technology that doesn't disrupt the underlying applications.

NXTware EV Implementation

NXTware EV easily installs on top of NXTera. NXTware emulates Entera/NXTera servers and clients enabling users to easily overlay NXTware on existing applications to provide integration with platforms such as .Net and J2EE.

Overlaying NXTware EV

Supports standard Entera communication protocols. This allows it to easily communicate with existing clients and servers. Installing NXTware in an existing environment provides legacy applications with all of the features and benefits of NXTware EV.

Additionally, by using applications upgrade to NXTera from Entera, better performance with NXTera Optimized for NXTware integration
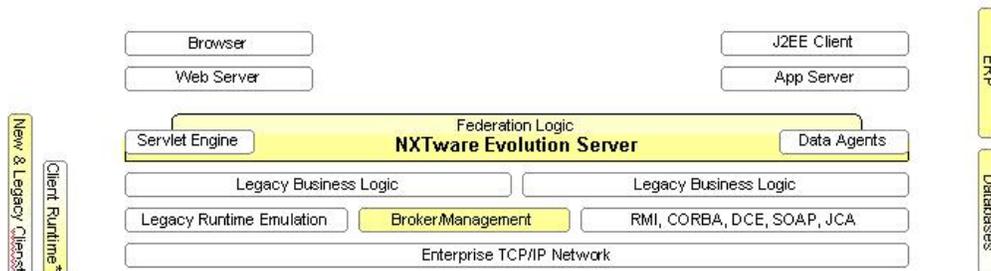
NXTware EV Topology
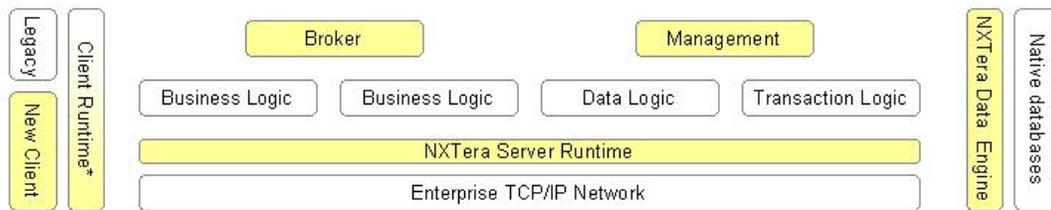
Update NXTera Topology

Overlaying NXTware Evolution Server

By installing NXTware EV on top of NXTera 5.0, your applications will be able to take full advantage of NXTware's lightweight NXTera emulation capabilities. Existing applications will seamlessly communicate with the Evolution Server without any changes to the code or required recompilations. Existing NXTera/Entera servers will be able to receive requests from web browsers, .NET clients and J2EE clients and servers, instantly addressing modernization and integration requirements.

At the same time, legacy client applications can easily access contemporary service providers. By make simple changes to the NXTera broker, legacy clients will be able to access new resources that take the place of old ones.

Overlaid NXTware Topology

NXTware EV: New Evolution Features

NXTware EV Interoperability, Emulation and Federation

NXTware EV accomplishes these capabilities by enabling contemporary clients and servers to emulate your applications expected APIs. For example when using .NET a .NET stub is generated that emulates legacy communication protocols. It can the be compiled into the client to enable interoperability with legacy systems.

In the case of contemporary services, NXTware can act as a service intermediary that switches protocols as required for interoperable communications processing. In combination these capabilities enables the federation of legacy servers <u>and</u> contemporary servers. Now a client can make a request that requires results from multiple servers and servers, with federation logic that conditionally orders and calculates the federated results.

NXTware Servlet Engine

NXTware EV contains a 100% Java HTTP Server and Servlet Container. This means that you do not need to configure and run a separate web server (like Apache) in order to use java, servlets and JSPs to generate dynamic content. Based on Jetty it is a fully featured web server for static and dynamic content. Unlike separate server/container solutions, this means that your web server and web application run in the same process, without interconnection overheads and complications.

- HTTP/1.1 server, it can be configured in a jar file under 300KB
- Consistently benchmarks as one of the fastest servlet servers
- HTTP server scales to thousands of simultaneous connections

NXTware EV Data Agents

NXTware EV Data Agents replace the old Entera SQL Start, with a new Java-based JDBC data access agents. These flexible agents are designed to natively communicate using SOAP to Binary or XML data. (Optionally high speeds NXTware DataStarts are also available for the fastest possible data processing. DataStarts are compatible with legacy Entera SQL Starts)

5. Phased Implementation of NXTware EV

A phase approach is available for companies wanting to implement segments of the capabilities provided by NXTware.

NXTware Evolution Components

NXTware Evolution Components (EC) are evolution agents that provide given subsets of the functionality available in NXTware. The NXTware EC is available in the following configurations:

- NXTware EC: XML Provider with Servlet Support
- NXTware EC: JCA
- NXTware EC: CICS
- NXTware EC: Open VMS
- NXTware EC: ERP

Contact your eCube Salesperson for more information.

6. Eliminating Legacy Dependencies with NXTware Evolution Server

Entera Evolution: A White Paper, Part Two addresses the next phase of the evolution process when all communication is updated to contemporary protocols and transports. In that phase legacy business logic is either:

- Recompiled with substitute call implementations

- Converted to UML/XML and re-provisioned

- Integrated into an RMI compatible wrapper

This process is outline in the forthcoming second part of this white paper. Please visit our web site and register for NXTware update information.

7. Operational Efficiency and Minimized Risk

Modernization has a cost, but it shouldn't be performance. In many cases IT organization are building new systems to replace legacy applications, only to find the legacy systems out perform them. A true evolution strategy embraces a commitment to steady improvement in performance and the fulfillment of service level goals.

Correspondingly, risk is the something every business executive has to deal with. Whether a company decides to "stay put", redevelop, or evolve there is risk involved. eCube is committed to balancing the risk, with proven technology and methods that insure the value of IT efforts moving into the future. Old applications can be maintained, renewed, evolved, transformed or harvested to speed new development in such a way as to assure the ability of IT to meet its commitments to the business and exceed expectation to reliability.

8. Summary

IT managers are facing a variety of business pressures that are forcing them to evaluate the modernization of legacy systems. Business requirements for lower operational costs, better performance, reduced risk and compliance with industry and corporate standards are driving this process.

With NXTera 5.0 and NXTware EV, eCube systems provides a systematic approach to legacy evolution the extension of technology equity. This process is based on the evolution of existing business logic and the integration/Implementation of contemporary platforms, such as .NET, J2EE, Web Services, HTTP/Servlets and XML.

eCube Enterprise Evolution enables companies to extend the value of existing applications and business logic by defending it from "software hardening" the growing inflexibility of legacy systems and enabling it to participate as an enterprise service provider.