Advanteks Inc.

The Enterprise Data Bus

Part 2 - Layers

The working components in your Enterprise System

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Introduction

This document is a companion to the Advanteks Presentation of the same name. The information presented here is intended to present an overview of the strategic planning our consultants have put together. These ideas are based on work Advanteks consultants have performed for several clients and are intended to encapsulate theories built during those projects.

Part 1 in this series ***(Enterprise Data Bus – Part 1 - Strategy)*** set out the strategy to design the framework of a corporate system to manage data movement throughout your Enterprise. In this set of documents (Part 2 – Layers - the presentation and accompanying PDF) we outline the layers of complexity that make up the data bus and some of the issues and challenges to be prepared for when your company starts adding the layers to the framework.

For the purposes of this document the following sections (Routing, Data Transformation and Integration) are very generic. When we enter the discussions in the Data Bus Engine section, it will document some real solutions that have been implemented by Advanteks and other integration specialists.

Layer 1 – Routing

At first glance it might seem that routing is the simplest part to this design but that’s not the case at all. As you will grasp very quickly, building a design that works and is adaptable to potential future requirements will require some heavy information gathering before you can start “pouring the foundation’. In its most basic form data routing would have 1 underlying feature:

> ***“ To accept data from the originating system and deliver it to the destination system“***

….. however there will be some additional details that will soon make that simple statement into a complicated stream of “if-then-else” statements.

- Security – There are a number of aspects to security when you plan the routing requirements. Is this source the *“owner”* of this data? Who can see it and how is that controlled? If either the source or the destination is reached via the Internet, does the connection need to be secured using SSL Certificates or some other method of certifying authenticity? Does the data need to be encrypted?
- Bandwidth – How large are the data packets that will be transferred? Will your Data Bus be responsible for breaking them up if they are too large?
- Logging – Will logging of all data movement be required? Archiving of data or logs?
- Routing information – Will the source and destination systems be able to pass routing information directly to your Data Bus. If not how will routing be accomplished?
- More Routings - Other than the initial destination for this data, is there a potential for other users/systems to want access to it? How will that be managed
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There are 3 common methods by which data can be routed:

1. Queue-to-Queue – This method relies on a rules-based format whereby a rule is defined saying anything appearing in a specific queue (or file folder) is destined for another specific queue (or folder)
2. Content-Based – The engine can be driven based on a specific set of text that appears in the data packet. In this way, the rules can be built to route data with specific content to a specific queue (or folder).
3. Publish/Subscribe – This method is based on a set of data definitions being Published and applications (or users) can Subscribe to these data sets.

These 3 methods can be the core of a very robust data routing mechanism if they are built around a set of delivery modules that can distribute data to a variety of services – i.e. email, FTP, Message Queues, FAX etc). Additionally, if data can be delivered directly to an end-user system (JD Edwards, SAP, etc) the system becomes even more robust and efficient. This technology is further discussed in the *Integration* section below.

Layer 2 - Data Transformation

Data transformation, as discussed in this document, actually addresses 2 types of change. Both are common, as shown in the accompanying presentation slides.

1 – Transformation of Data Packaging

This refers to a situation where the content of the data packet may not change but may have taken on additional information (header, footer, control codes) that is required by the system it is passing the data off to. An example of this transformation is readily seen in the aviation industry where Teletype messages are moved between systems using the SITA TypeB message format. Another is the EDIFACT format (**E**lectronic **D**ata **I**nterchange **f**or **A**dministration, **C**ommerce and **T**ransport)used for transmitting data between Government Agencies.

If your industry uses standardized data formats like these, it is critical that you embed these encapsulations in your Data Bus. The big advantage behind this strategy is that you only have to write these Data Encapsulation routines once – in your Data Bus. If you have multiple internal systems that need to receive this data, you can use the Data Bus to buffer them from having to understand any of your “Industry Standard” data formats. Similarly, if you have multiple external sites transmitting data to you in this format, your Data Bus can transform the format to one that your internal systems have standardized on (XML, SGML etc) and again your internal systems can be fed one standard data type.

2 - Transformation of Data Content

In most cases, the actual content of the data is not modified while passing through your enterprise systems. Typically, this is not something that is attempted without a great amount of investigation and requirements building. Logging, replication and other forms of business process engineering must be performed along with validation of the credibility of the data source before embarking on this track.

For the most part, the Enterprise Data Bus will be crafted to perform efficient movement of data and without a doubt that is where it will build your greatest Return-On-Investment. If your business needs point to a requirement for you to manipulate, edit or transform data, tools are readily available to allow you to build the solution you require. That solution can be as open and configurable as you need or it can be a “black box” built for you that simply does the job.

Layer 3 - Integration

The integration layer of the Enterprise Data Bus is the system-facing component in the flow of data through your corporate architecture. Internal to the core engine, data is simply a generic package to be picked up at its source and delivered to its destination. However, those sources and destinations may have some differences in their design that make it inherently difficult to interface with. Some of the considerations in the interface component could be the Operating System, the data format and the security envelope. For example, if you are moving data between a Windows server across the Internet to a mainframe host system you will encounter all three of these challenges. The choice of a robust and well-designed set of tools in your Data Bus engine will ensure your ability to operate easily in these diverse environments.

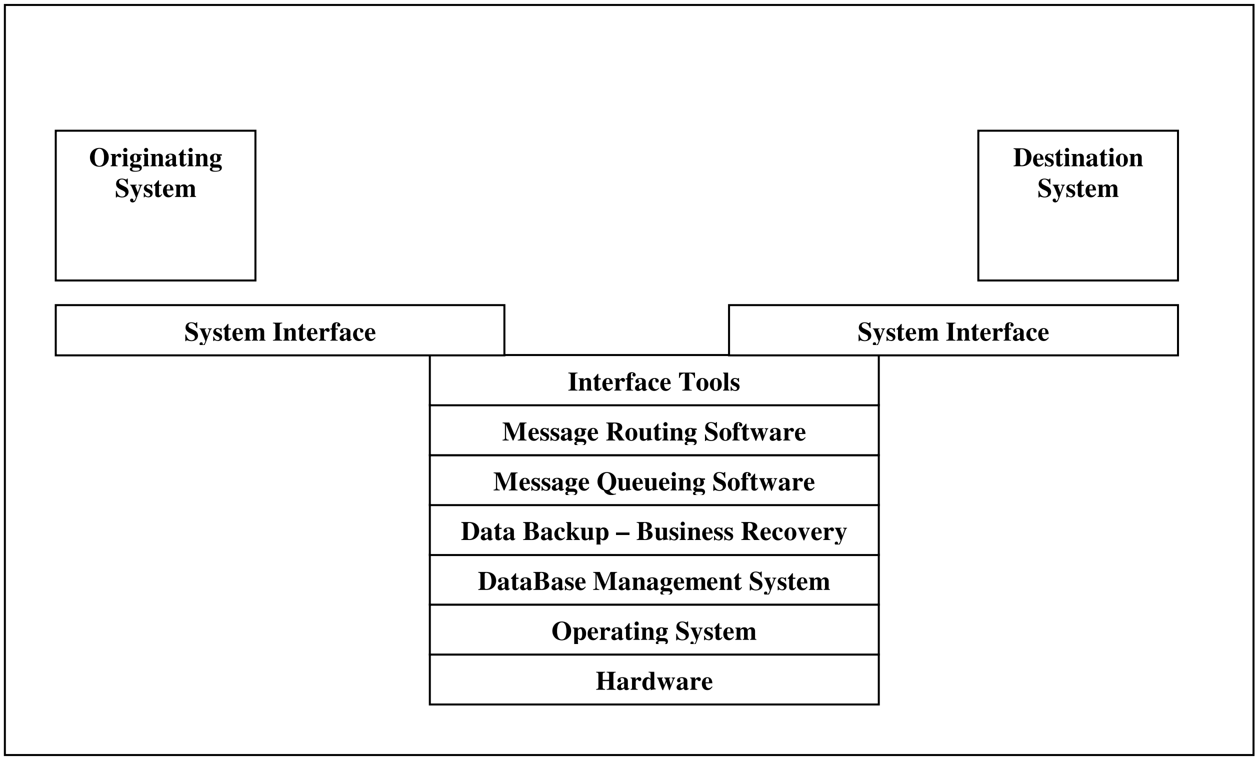
This topic, integration, is a critical one in your design work. How well you understand and document your integration requirements and make them a part of the architectural design will directly affect the ability of your solution to adapt itself to the way your requirements will change over the life-cycle of the Enterprise Data Bus. In addition to evolving internal requirements, you will be constantly tuning your data flow to accommodate many external forces that change the way you do business. Some of these forces include regulatory, technology change and market focus and they will always be volatile, always be changing. Your ability to adapt your systems to that change will be a large part of the scorecard you build when evaluating the success of your design in later years.

The Data Bus Engine

Although it might be nice to drop down to your local software store and buy a shrink-wrapped package that will deliver the solution you need to implement a turnkey Enterprise Data Bus, things are not quite that simple. As you work through the process of understanding your requirements and the work flow of your business, you will better understand the questions that need to be asked (and answered) when putting together the layers of technology that will result in your Data Bus engine.

Inside the “engine” itself, you will see that there are many levels of complexity to be addressed.

Data Bus Engine



As shown in the above diagram, there are multiple components to the engine and each of these represents a technology that needs to be understood and supported. Some of the layers are similar to technologies that you probably already have in your enterprise, such as Hardware, Operating System, Data Management, Business Recovery and possibly even Message Queuing. When you enter the realm of Message routing, System Interfaces and Interface tools, these need to be designed and implemented to meet your business’s specific needs.

In the Aviation world, Advanteks has worked with partners and vendors to design these systems based on industry proven tools that are flexible enough to handle the complex interface and routing requirements of that industry. An example of an end-to-end solution providing data interfaces between airline internal systems and those of an airport is depicted in our accompanying presentation ***(Enterprise Data Bus Part 2 – Layers.pps)***.

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Summary

This document is intended as an over view in order to stimulate your organization to start thinking and planning with an eye to enterprise strategy. We have focused on the Data Bus – how information moves through the organization. With respect to the three components that make up the internal layers of the Data Bus more investigation needs to be done on how they can be successfully designed to integrate fully with your internal systems. Also critical for your solution may be the requirements to build an open system that is re-usable and extensible by your in-house developers.

These topics are the core of the work product developed by Advanteks and their associates. To further investigate the layers in the Enterprise Data Bus and to understand how they can be implemented in your organization and fulfill Business needs there, contact Advanteks at info@advanteks-inc.com.

In summary, our hope is that that we have helped you see more of the options that are available for you to inject a higher level of innovation when planning your enterprise architecture. If your Requirements Building efforts can be modeled to cover the business processes practiced across departments in your workplace, you will be well on your way to understanding the building blocks you will need to create the true Enterprise Data Bus architecture.

Strategy – Innovation - Integration

Advanteks, Inc. **is a Canadian consulting firm specializing in aviation technology and the strategy involved in implementing emerging technology solutions.**

Advanteks consultants have over 20 years experience working with airlines and airports at solving technology problems and using innovation to implement a wide range of solutions.

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