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THE DATA INTEGRATION CHALLENGE

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E xtracting data from applications, databases, and digital files and transforming it into a format that can be loaded into another system is one of the fundamental challenges faced by business users, developers, IT solution integrators, and systems administrators alike. Known as data integration in industry jargon, the challenge of ETL (Extract Transform Load) has been around since computers have existed, and will continue to be a fundamental responsibility for anyone that works with data for generations to come. The traditional drivers of integration include business analysis, process automation, data migration, synchronizing application data, providing real-time data updates to trading partners, creating self-service customer portals, and complying with data regulations such as HIPAA.

The number of data sources is not diminishing. Instead, thanks to the explosion of Internet of Things (IoT) devices, cloud services, and edge computing, for most organizations, the number of data flows under management is growing rapidly, with no end in sight.

Technology alone is not the sole driver of the increase in data sources. Business models are rapidly evolving as organizations of all sizes seek to carve out new markets and disrupt existing ones. These new business models are typically data-driven and evidence-based, and increasingly require that businesses be able to adapt rapidly to change. This drives not only a requirement to adapt to new technologies and data   sources; it creates pressure to be able to do so more rapidly than organizations have been able to in the past.

As business models evolve, so to do National and International laws. Regulations are constantly changing, which in turn can disrupt both established and emerging economies. The EU General Data Protection Regulation (GDPR), which recently came into force, is an example of a regulatory scheme that has caused a great deal of change in how organizations operate their IT and need to manage their data. Change inevitably leads to increases in merger and acquisition activity, which only magnifies the number — and complexity — of data integration challenges faced by today's IT teams.

Data integration is critical to all aspects of modern IT, applications and services. Application developers need to architect their

solutions with robust and easy to maintain data integrations, avoiding hand coding. According to Gartner, hand coding your integration may initially bring a 20% reduction in cost, but it can result in a 200 percent increase in maintenance costs.

MANUFACTURING AND IOT

The interconnection and automation of modern manufacturing is one example of a sector undergoing a fundamental transformation; one that is in turn creating innumerable data integration challenges. The modernization of manufacturing is more than simply connecting backend IT solutions to the internet, or festooning manufacturing plants with sensors. This is typically discussed using the catch-all buzzword "the Industrial Internet of Things (IIoT)".

and interoperability of IIoT devices such as sensors, capital equipment, gateways, servers and data centers. Back office systems, ranging from finance suites to human resources apps, must support exchanging data with everything from card readers to process tracking systems. The seconds of time that people and robots work on specific tasks are automatically recorded, and increasingly every component is tracked throughout the production process and across the factory floor, to ensure that every resource utilized can be accounted for and optimized.

Let us consider for a moment the instrumentation of waste management in a chemical factory. Chemical waste is often sealed in containers and then removed from the primary production facility for further processing. Traditionally, filling of the

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The information flowing out of a manufacturing plant's sensors must be processed by applications and services that fall within the scope of traditional Operations IT teams. These teams need to perform data integration on these myriad new data sources, not only to drive the manufacturing plant's operations, but to keep those plants secure. Data integration is every bit an IT security challenge as it is an operational one.

Data management in manufacturing extends beyond the challenges of integration

relevant containers was done by timer-controlled gravity-assisted pour. Containers would frequently leave the facility only partially full, costing the production facility a great deal in the shipping of hazardous goods with empty space.

Modern containers are instrumented. They can detect not only how full the containers are, but with which substances, whether there are structural defects in the containers, and much more. Universal location tracking of these containers

throughout the supply chain is made possible through technology such as NFC (Near Field Communication), with container information, status, and location data updated and loaded into data warehouses. Taking this data, transforming it so that it can be understood by other systems, and then loading into those systems is data integration.

The data from these containers can be fed in real-time to the pouring systems to ensure containers are full. The data can also be fed into auditing systems to enable automated reporting for auditing purposes, reducing the costs and time associated with regulatory compliance.

DIGITAL BUSINESS PLATFORMS FOR DATA INTEGRATION, TRANSFORMATION AND MANAGEMENT

In their efforts to interconnect physical infrastructure with digital solutions, organizations of all sizes are turning to hybrid data integration management platforms. These data integration solutions automate large portions of data integration, using a Graphical User Interface (GUI) approach to removing tedium and reducing errors, giving those organizations which have adopted them a distinct advantage over those that choose not to.

Integrating data for manufacturing purposes is only one amongst many data integration use cases. Data integration is an organization wide challenge and already impacts virtually every business on — or off — the planet.

Business service providers such as ADP have been long-time users of data integration technology.

Benefits administration is a key component of ADP's Human Capital Management (HCM). ADP integrates enrollment data and payroll

deduction data with a variety of sources and that data must be accurate and loaded quickly. Since ADP depends on other systems within the cloud, ADP needs flexibility to transfer that data and create a great service experience. This is ADP's business and part of the value ADP provides, and something that ADP clients shouldn't ever have to worry about. ADP handles integration in the cloud on behalf of their client as part of ADP services. In essence, ADP business runs on having good, clean data, processed and delivered quickly. Without the right integration, ADP might risk poor service experience. And the complexity increases as we add more and more data and sources. ADP Reduced partner onboarding from 90 days to 30 days, and scaled the headcount to interface ratio from 1:10 to 1:2,000 annually. This equated to millions of Dollars in cost avoidance since then and has allowed ADP to scale, growing their business about 20 times, and holding the line on costs.

RAPIDLY ADAPTING TO CHANGES IN BUSINESS CRITICAL DATA FROM A VARIETY OF EVER CHANGING SOURCES IS ANOTHER COMMON USE CASE.

Bloomberg BNA's flagship software product is BNA Fixed Assets, a leading product for managing enterprise assets for tax and accounting purposes. As a commercial software provider, Bloomberg BNA expanded efforts to integrate data between customer systems and Bloomberg BNA tax software products. It's increasingly important and, while customers are willing to perform some tasks manually, the sheer volume of data requires them to automate as much as possible. This makes it imperative to overcome any challenges that come with

integration. In addition to being able to fully automate the process and get it right, Bloomberg BNA needed to collect information from different sources to deliver to customers more comprehensive and flexible solutions. Tax law and regulatory changes can drive significant changes in customer data. This means Bloomberg BNA often must gather information from disparate sources outside of ERP systems, including data that is actually housed in spreadsheets. Overall, Bloomberg BNA are working to be all-encompassing in their integration efforts and attempt to take data from any sort of solution and in any format.

compensation workflows, and integrates seamlessly with customers' enterprise applications, which typically include Salesforce, SAP, Microsoft and Oracle among others. Actian DataConnect APIs and management tools provided Xactly with an exposed layer, enabling rapid development and delivery of its on-demand services to customers. Actian Data Integration and other tools at the heart of the workflow support quick development of data-intensive processes. The platform workflow layer also leverages Actian data services, including the Actian catalog of data adapters, to accelerate development. Xactly embedded Actian DataConnect within

BUSINESS MODEL INNOVATION HAS ACCELERATED WITH SOFTWARE-AS-A-SERVICE (SAAS) SOLUTIONS RAPIDLY GAINING POPULARITY WITH ORGANIZATIONS THAT DON'T HAVE EXTENSIVE IT RESOURCES.

Business model innovation has accelerated with Software-as-a-Service (SaaS) solutions rapidly gaining popularity with organizations that don't have extensive IT resources and that are looking for easy ways to access the software they need. SaaS solution providers often embed integration technology and engines directly into their application technology stack with APIs, SDKs, and Command Line tools to fully control the data integration, transformation and management in the most optimal way.

Xactly Corporation understands that human capital is every company's greatest asset. To serve its customers effectively using a SaaS delivery model, Xactly automates sales

its Incent application using the well-documented Actian API for Java.

Omni-channel retail is another use case. A photographic lab, for example, may have one order entry solution for bulk photographers, another for boutique photographers, yet another for consumers, in addition to a website for the purchase of photographic equipment and accessories. All of this data must be fed into a single eCommerce Point of Sale (POS) system, as must inventory data from suppliers.

The data from the POS system, combined with the data from the production systems is then also combined into the lab's middleware solution. The middleware solution enables sales

to pull regular reports, the stockmaster to predict inventory needs, and shipping to automatically generate waybills for finished orders.

The POS system, production systems, middleware and logistics solutions are all different solutions from different vendors. The data integration requirements will vary from one application to the next. One application may be a legacy Supply Chain Management (SCM) system, while the next is a modern cloud-delivered service.

The data flows among the many and varied solutions are all examples of data integration enabling automation. Removing the human factor from waybill and invoice generation eliminates errors, and for one photo lab resulted in hundreds of thousands of dollars a year in savings for a company whose annual turnover was only five million dollars.

Additional use cases are easy to find. In the health care sector alone, one could give a week-long seminar on data integration and the Internet of Medical Things (IOMT). Patient monitoring and bed management, laboratory management and CPOE systems, imaging and diagnostics integration, hospital supply chain management, insurance/claims/benefits processing: the list goes on. Integrating these applications, data sources and endpoints can be tricky, as there is often a mix of regulated (e.g. HIPAA) and unregulated data (e.g. sensor data from smartphones and wearables) that has be considered.

Business process automation, fraud detection and reduction, application to application integration, and database merging of acquired organizations are all use cases where it is easy to see why data integration matters. Even connecting a chatbot to an enterprise knowledgebase to reduce support costs isn't

possible without data integration. Data integration touches every part of modern business and is considered an essential part of the digital business platform.

DATA FLOWS LIKE WATER

There is more to data integration than simply taking the raw data from one system and inserting it into another. In many cases, data integration is transformative. This is true both in the technical sense – the data itself is transformed as part of data integration – and in the more abstract sense that data integration can transform an organization by enabling automation.

From a business process point of view, data integration between digital systems is often a replacement for manual processes. Manual processes are implemented by humans. Humans are both inconsistent and error prone, whereas direct communication between applications and/or devices occurs the same every time.

Looking at data integration from a technical viewpoint, the entire reason data integration is even a concern within IT is that it is rare for any two IT systems to treat data in the same way. Two systems may use different time formats, for example. Similarly, one system may use "M" to represent male while the other uses the word "male".

One system may contain an individual's complete medical history, and another system contains only their name and a unique ID built into their MedicAlert bracelet. Clearly these two systems contain wildly different data sets. However, integrating the two datasets via a third-party solution may allow first responders the ability to immediately pull up information on an unconscious

individual's medical history, in a consistent and repeatable fashion.

Data is cleansed, transformed, and synchronized through the integrations. In today's world, data frequently leaves the boundaries of an organization's network and intermingles with data in the public cloud, data from suppliers and data from customers — even government sources. Accomplishing this requires secure platforms and standardized data transportation methods, in addition to the ability to transform, filter and otherwise manipulate data so that a multitude of different systems can interact with it.

builds trust. Making data available to one's customers can, for example, help those customers forecast their supply chain needs. If customers can see what your inventory looks like, and what your manufacturing capacity currently is, then they can make evidence-based determinations about whether or not they need to consider additional suppliers to meet their demands.

Helping one's customers avoid supply crunches at peak times not only helps reduce acrimony and recrimination when demands cannot be met, it helps one's customers become more profitable and build trust with their own

TRADITIONALLY, EACH ORGANIZATION WAS A SILO: EACH HAD THEIR OWN DATA SETS, AND RARELY EXCHANGED THEM.

Traditionally, each organization was a silo: each had their own data sets, and rarely exchanged them. Often, larger organizations consisted of numerous silos, only infrequently exchanging data, a problem that only grew worse with as business units engaged in shadow IT in an effort to bypass internal IT in order to accomplish their aims more quickly.

Today, organizations of all sizes are both data sources to their suppliers and customers, as well as data consumers from those same organizations. It is this interchange of data between silos (both within and amongst organizations) that is a large part of why data integration is transformative (in the abstract sense) for organizations.

In addition to the obvious automation benefits, data availability makes organizations more transparent, and transparency

customers. The more profitable your customers are, the more likely they are to continue to require your services, and the more trust is built between the two organizations.

Trust is one of the most difficult commodities to obtain, and one of the easiest to lose. How fortunate then, that the availability of data through integration can help build and maintain it.

WHAT ACTIAN DATACONNECT DOES

Actian DataConnect provides an enterprise-class data integration platform that makes extracting, transforming and loading data simple, with 200+ pre-built connectors that support many of the most popular enterprise applications and databases.

Actian DataConnect integration data flows (including data maps and

transformations) can be developed by business users (often called Citizen Integrators) using a low-code visual Integrated Development Environment (IDE), or programmatically by developers using a powerful Software Development Kit (SDK) or Application Programming Interface (API).

Integrations are configured, scheduled and managed via the user friendly Actian DataConnect Integration Manager. Job execution log file analysis via the integration manager is visual and intuitive, making it easy for users to monitor the performance and troubleshoot integrations.

Actian makes it easy to identify individual data fields from multiple data sources, apply transformations to that data, and then integrate that data into a target system or database. Data sources can be traditional IT applications, cloud services, embedded solutions, IoT platforms, or virtually anything else that can produce data.

Actian DataConnect is designed for scalability and security. Common data integration patterns, transformations, and macros can be defined and saved as reusable templates that can be shared across an organization. Access to enterprise source control systems where design templates are stored is controlled through inherited user roles and permissions. Enterprise administrators create users and groups, assigning approved templates and macros to these users and groups. Users with the appropriate permissions can view, configure, deploy, run, and manage integrations. Once Macros are created and encrypted (e.g. the password that provides access to a database) they cannot be read or edited by anyone, thereby providing another layer of enterprise security.

For organizations wishing to manage integrations from a data center, the Actian DataConnect Platform operates like a traditional IT application. It is installed onto an Operating System Environment (OSE), and managed just as one would manage any IT solution under an organization's full control. Actian DataConnect Platform can be installed on-premises, or in a bring-your-own enterprise Virtual Private Cloud (VPC).

For those seeking to have the entire underlying infrastructure taken care of for them without having to worry about DevOps, CloudOps, infrastructure management etc., Actian offers the Actian DataConnect Platform-as-a-Service (often referred to as an iPaaS). The Actian DataConnect iPaaS offers all the benefits of the standard Actian DataConnect platform, but it can be instantiated in moments, and is fully maintained by Actian — you only need to worry about your integrations.

For those seeking to embed the data integration technology directly into an application or SaaS solution, Actian DataConnect Embedded is the solution of choice.

THREE OF THE MOST COMMON DATACONNECT EMBEDDED INTEGRATION USE CASES

Actian DataConnect is a proven solution. It serves as the data integration platform for some of the world's largest organizations, and underlies some of the most complex data integration efforts currently undertaken. DataConnect Embedded allows developers to integrate this capability directly into their applications. DataConnect can be integrated into embedded solutions by offering the API and the engine as discrete application

SYSTEMS INTEGRATORS, OEMS, AND VERTICAL SPECIFIC SERVICE PROVIDERS OFTEN INTEGRATE DATACONNECT EMBEDDED INTO CUSTOM MIDDLEWARE SOLUTIONS.

components. DataConnect can be controlled in the application via API, SDK or command line interface.

For example, DataConnect can be embedded as a discrete hybrid data integration engine to power an IOT platform. Here, DataConnect may be used to integrate data from dozens of related cloud or on-premises gateways, databases, analytics platforms, and applications, providing bi-directional data transfers and updates, and presenting a single point of data interchange to end-user applications and Digital Twins.

Systems integrators, OEMs, and vertical-specific Service Providers often integrate DataConnect Embedded into custom middleware solutions. Given that one of the primary purposes of middleware is to perform data integration, embedding a tried-and-true commercial data integration package such as Actian DataConnect is a powerful differentiator, and far more scalable than hand-coded integrations.

In a similar manner to both of the above, Actian DataConnect can be easily embedded into Software-as- a Service (SaaS) and Platform-as-a-Service (PaaS) solutions.

SUMMARY

Data integration is critical to modern organizations of all sizes and has a direct and significant impact on business agility. It is a fundamental part of how IT has been done for decades, how it is done today, and how it will be done for generations to come. Data integration is the hard work of IT, and anything that can be done to make it less tedious is generally appreciated by all.

Unfortunately, hand coding data integration isn't getting simpler. The exploding number of IT solutions combined with the ongoing digital transformation of multiple industries creates a never-ending torrent of new data flows and data integration requirements. Organizations should not have to learn to use multiple data integration technologies.

Actian DataConnect is a comprehensive and flexible data integration platform that can easily handle a multitude of use cases, from on-premises IT, to cloud computing, to embedded use cases at the edge of the network and beyond to IoT. Watch this recorded webinar for a technology overview, and to see a demonstration of how to integrate ServiceNow Incident Management to Salesforce.com to improve customer experience.

Find out more:

www.actian.com