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**1.)**

**2a.** *How data is shared or combined across different systems* ***in* Data Integration**

**Firstly, what is data integration?**

**Data integration** - a way of collecting data that changes the item to standard format and storing it in a central location or data warehouse.

**What exactly is system integration?**

In general, the term system integration describes combining different software subsystems in a way that allows them to operate as a whole – a single source of information. The data aggregated by each integrated system gets easily distributed between them when needed. For the system integration to be successful and really serve its initial purpose, enterprises often need to build up customized architecture or even a composition of applications.

Building the right system integration strategy will allow you to maintain an uninterrupted data flow between the different systems your organization is using and make sense of the enormous amounts of data you probably already have. One of the best ways to achieve this is through a comprehensive integration platform.

It’s not always easy to integrate all your data, though: data integration comes with several key challenges, and it’s important to be aware of them to choose the right integration tool for your business. Otherwise, you risk creating bottlenecks further down the line or ending up with the wrong platform.

The **main objective** of data integration is to combine and consolidate data from a wide range of sources into one coherent form.

**The basics of the system integration**

Systems integration is not an easy task. In fact, it’s a complex process that requires a lot of attention, research and knowledge of the current (and subsequent future) needs of the enterprise. When done properly, companies benefit from boosted effectiveness, team productivity and better goal achievement.

There are few critical components of each successful system integration:

Outlining Requirements: Understanding an organization's IT demands, including data transfer volumes, integration types, and future growth plans, aids in making informed decisions regarding system integration solutions.

It also may have different variations in the specific terminology or steps involved in these processes. The overall idea remains consistent: It starts from extracting, and then transforming, and the loading data to enable meaningful results   
  
The first step is **Extraction**. In the first step, data is gathered from different sources like databases, files, APIs, and other systems. This involves finding the right sources, choosing how to extract the data, and then retrieving it.   
  
The next step is **Transforming**. After extracting the data, it must be transformed into a consistent format. This involves cleaning up errors that standardize data from different sources. It makes sure that it meets quality standards. It may also include reorganizing the data to fit the intended structure or model. Example of confusion that can arise with inconsistent data formats:  
  
In **Date Formats** some records use MM/DD/YYYY and others use DD/MM/YYYY. It can lead to misinterpretation of dates. This format can be interpreted as March 4th or April 3rd, depending on the format.

**Name Capitalization** is also important because some names are entered as “john doe” and others as “John Doe” it can create discrepancies when sorting or searching for names. Currency formats and units of measurements are also necessaryto be consistent.  
  
The last step is **Loading** Once the data is loaded it is loaded into a target system or data warehouse for storage and analysis. This process includes matching the transformed data to the structure of the target system that updates records. They make sure that the data remains accurate and consistent.  
  
  
  
  
Other ways of sharing data on various systems:  
  
  
Using an **Enterprise Service Bus(ESB)**, it is easier for different applications and services to communicate with each other. It acts as a middle man that allows systems to exchange data easily. No matter what technology they use!  
  
**Data Virtualization** is also a way to combine data from different sources into one easy-to-access location. It lets users access and query data in real life without needing to move or copy it.  
  
**Data Replication** can also be useful because It’s a process where you copy the data from one system to another to keep the target system updated.   
  
  
  
**2b**. Example where workflows are automated between systems in**Process Integration**Imagine a company. A Tellerman Outdoors that introduces a new purchase order (PO) system. This system is integrated with both their bookkeeping software and inventory management system.   
   
When a customer makes a purchase, the PO system automatically updates the inventory. It shows how many items are left. If new inventory arrives, the system updates the records without any manual input.  
  
This Integration saves time by eliminating the need for manual data entry. It speeds up order processing and minimizes delays in purchasing and stocking. Additionally it reduces human errors which can lead to costly mistakes in inventory and finances. This also improves tracking and budgeting by categorizing and recording purchases instantly.  
  
  
**What is process Integration then?**  
  
Process Integration is the method of connecting various applications, systems, and people in a business so they can work together smoothly. It helps ensure that software and staff coordinate well, which boosts efficiency and productivity as the business grows or adopts new technologies.

**2c**. How applications communicate using APIs, middleware, or other technologies in **Application Integration**.

Applications communicate using APIs, middleware, and other technologies to enable seamless interaction and data exchange bssetween different systems. Here's how these technologies facilitate application communication:  
  
**Lets focus on API first!**  
APIs are sets of protocols and tools that allow applications to interact and share data or functionalities. APIs also define the methods and data formats that applications can use to request and exchange information, ensuring consistency and compatibility.

For example, a cloud-based CRM like Salesforce might provide APIs that other applications, such as ERP or e-commerce platforms, can call to retrieve customerdata or update records.  
  
**While on Middleware:**

It acts as a software layer that connects different applications. It allows them to share data and communicate with each other even if they are not designed to work together. It also acts like a translator that makes sure information flows smoothly between systems that might otherwise be incompatible. Moreover, middleware helps the data be converted into compatible formats and routes information to the appropriate applications. It helps systems like ERP and CRM to communicate and exchange data efficiently to function.

**2d**.Look for examples of systems that share hardware,network or storage resources.

**In terms of network sharing resources:**

A local area network (LAN) is a system in which computers and other devices connect to each other in one location. Ethernet/Wi-Fi connections are examples of LANs

**Use cases of LAN:**

Home office and corporate network connectivity. Users in personal home offices and office networks can connect their devices and transfer data between each device.

Wi-Fi is the most common WLAN use case. A wireless network can use Wi-Fi radio signals to connect multiple devices in a single location.

While WLAN and Wi-Fi might sound like similar technologies, they aren’t the same. A Wi-Fi network is a WLAN.

**When storage share resources:**

A file hosting service like google drive, microsoft one drive, dropbox and so on

**On the other hand, when a hardware resource share:**

CPU: compute server (executes processor-intensive applications for clients), remote object server (executes methods on behalf of clients), worm program (shares cpu capacity of desktop machine with the local user). Most other servers, such as file servers, do some computation for their clients, hence their cpu Is a shared resource.

Printer: networked printers accept print jobs from many computers. Managing them with a queuing system.

**Infrastructure Integration:**

At its most basic level Integrated Infrastructure, also known as Hyper-Converged Infrastructure is a validated configuration that combines physical compute, networking and storage resources to form a single “out-of-the-box” solution.

**b**. What technologies or tools are commonly used for this type of integration?

**\*Data integration:**

**Manual**

As there’s no unified view, all users can access any data they need through all source systems.

**Application-based**

Best for small teams, this method requires each application to implement integration.

**Middleware data**

This method acts as a mediator, normalizing the data to add to the master pool. Middleware can help transfer data from legacy applications when they cannot connect to other newer applications.

**Uniform access**

Data stays in the source systems with several defined views that offer a unified view to all users.

**Common data storage**

This method creates a new system that copies data from the primary source while managing additional data outside of the original source.

**Data integration platforms typically include the following tools:**

**Data catalogs**

Helping businesses find and inventory data assets throughout multiple silos.

**Data cleansing**

Tools that detect and rectify data through replacement, modification, or deletion.

**Data connectors**

Moving data from one database to another and handling transformations.

**Data ingestion**

This allows you to gather and import data to use immediately or save for later.

**Data governance**

Tools that ensure the availability, security, usability, and integrity of data.

**Data migration**

Moving data between computers, storage systems, or applications.

**ETL tool**

As previously mentioned, the most common integration method.

**\*Process Integration:**

**Native integrations**

Perhaps the simplest approach to software integration is to find solutions that come with native integrations. As the name implies, these are built into software, giving you native access to them.

An example of a native integration would be a feature that lets you access your Gmail account from within a different app that’s not connected to or run by Google.

A major advantage of using native integrations is that the software provider offering integrations has taken care of any compatibility problems for you. In our Gmail example, you won’t have to wonder whether Gmail works in your app because the app’s developers have taken care of this for you.

One drawback is that not all tools offer the kinds of integrations you’ll need, so your selection may be limited based on where you can get your preferred integrations.

**API integrations**

APIs, or application programming interfaces, are another useful tool for facilitating process integration. That’s because APIs let software solutions “talk” to each other.

If you’ve got software that needs to exchange data with other software, you’ll want an API integration as these create a kind of bridge between the tools.

API integrations can help you connect more complex software where native integration isn’t possible. It’s good at letting you continue to use both tools separately while still connecting them and preventing the formation of data silos.

A notable advantage of these integrations is that they’re useful for a wide variety of different software tools, so you can keep building new and more complex hybrid solutions using API integrations. This helps with creating better experiences:

**Third-party software integrations**

It’s also crucial to consider integration software solutions, as these will often fill in the gaps left by native and API integrations.

Third-party integrations are great at helping you build integrated, all-purpose tech stacks that cover every one of your software needs. They make it easier than ever to create a company environment where all processes are interconnected and never isolated.

**\*Application Integration**

**Application programming interfaces (APIs)**

An API is a set of rules or protocols that lets software applications communicate with each other to share data, features and functions. APIs simplify and accelerate software development by enabling developers to integrate data, services and capabilities from other applications, instead of developing them from scratch.

**Middleware**

Middleware is software that enables communication and connectivity between applications or components in a distributed network, essentially creating “software glue” that binds different systems together. Using a range of intelligent features (message brokers, enterprise service buses (ESBs) and web app servers, for instance), middleware streamlines app development by facilitating communication between platforms that weren’t designed to organically connect.

**Webhooks**

Unlike API-led integration, which relies on code-based data requests, webhook integrations are HTTP callbacks that rely on events for application integration and data transmission.

An “event” Is any foundational data structure that records occurrences in the system or environment. When a system event occurs, a webhook will automatically trigger data exchange between network devices. Webhooks facilitate automated, event-driven integration workflows that can transmit data in real time (or near-real time).

**\*Infrastructure Integration**

**Cloud services and platforms**

are the backbone of modern infrastructure, offering scalable and flexible resources that can be managed and provisioned on-demand. Infrastructure Engineers rely on these services to build and maintain robust, resilient, and agile systems.

**Examples are*:*** Amazon Web Services(AWS),Microsoft Azure and Google Cloud Platform.

**Configuration management and automation tools**

- Are vital for Infrastructure Engineers to manage large-scale server environments efficiently. They enable consistent configurations, automate repetitive tasks, and ensure compliance with desired system states, which is crucial for maintaining system integrity and reliability.

**Examples are:**

**Ansible**

An open-source tool that provides simple automation for cross-platform operations, making it easier to configure systems, deploy software, and orchestrate more advanced IT tasks.

**Puppet**

A configuration management platform that allows Infrastructure Engineers to automate the provisioning, configuration, and management of servers and infrastructure.

**Chef**

A powerful automation tool that transforms infrastructure into code, enabling Infrastructure Engineers to manage and configure IT infrastructure at scale and with speed.

**c.** Provide a real-world example of this type of Integration and explain how it works.

**\*Data integration**

Customer 360: Combining data from multiple sources like websites, social media, and loyalty programs to create a single, unified view of each customer, enabling personalized marketing and improved customer experiences.

Real-time fraud detection: Integrating transaction data from multiple systems (payment gateways, bank accounts, etc.) in real-time to identify and prevent fraudulent activity instantly.

Inventory management: Synchronizing inventory data across warehouses, stores, and online platforms to ensure optimal stock levels and prevent product shortages.

Operational efficiency: Integrating data from production lines, maintenance systems, and quality control processes to optimize manufacturing processes and reduce downtime.

**\*Process Integration**

Another common use case of process integration is in helping to reduce the clunkiness of complex supply chains. For example, you can integrate many different kinds of systems involved with complex manufacturing supply chains, from procurement and manufacture to distribution and beyond.

This helps you get more items out in less time while ensuring that you’re able to spot any issues in the supply chain before they have the chance to grow into bigger problems.

The end result Is a more efficient business that can fulfill plenty of orders and continuously boost its bottom line.

**\*Application integration**

Healthcare: Application integration plays an important role in healthcare by integrating patient records with an electronic healthcare application. Integrating data into this application allows physicians and specialists to monitor patient’s health, ensuring timely treatment.‍

Banking: Banks provide services to their customers by integrating in-house applications containing customer details, loan application services, and other backend features to mobile applications.‍

Marketing: Integrating CRM, marketing automation, and analytics platforms to optimize campaigns and customer engagement

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Resource Planning: By integrating data from your organization’s enterprise resource planning (ERP) system with supporting applications, you can streamline business processes

**\*Infrastructure Integration**

A File hosting service like google drive, microsoft one drive, drop box and so on are example of Storage sharing resources, this describes Infrastructure Integration.

A CPU allows Multiple users to use the processing power of a single server or remote server at the same time. It’s important in cloud computing because it allows resources to be adjusted based on what users need, making it more efficient and cost-effective.

Printers can also classified as one, networked printers accept print jobs from many computers. Managing them with a queuing system.

**PART 2:**

**Case Study:**

"A logistics company has multiple systems in place for managing inventory, customer orders, and delivery scheduling. However, these systems are not integrated,leading to delays in delivery, poor inventory management,and customer dissatisfaction. The company uses a legacyinventory system that cannot directly communicate with its modern customer order management system. The delivery tracking system is outdated and does not provide real-time updates to customers. As a result, the company is experiencing a high rate of customer complaints and increased operational costs."

**Here are the problems we encountered!**

**Data incompatibility** is a major technical issue in system integration that may cause data loss or interpretation errors. To address this, robust data cleansing and clear data validation protocols are essential.

Secondly, organizations often use familiar systems and are hesitant to use peers' apps, despite providing valuable insights. **WE NEED TO ALIGN** different systems to improve data accessibility. While many apps have basic system integration capabilities, they may not solve all challenges. A no-code integration platform is recommended for bidirectional system connections, data gathering, and multiple app connections.

The lack of resources and expertise is also a major issue here. Large organizations should prioritize system integration over cutting costs to make sure the operation will be successful.

**References:**

DigitalRoute. (n.d.). *Data integration*. Retrieved October 8, 2024, from <https://www.digitalroute.com/resources/glossary/data-integration/>

Indeed Editorial Team. (n.d.). *Process integration: Definition, benefits and how to integrate*. Indeed. <https://ca.indeed.com/career-advice/career-development/process-integration#:~:text=Process%20integration%2C%20or%20business%20process,it%20reach%20its%20primary%20objectives>.  
  
  
Cleo. (n.d.). What is application integration? Cleo. <https://www.cleo.com/blog/what-is-application-integration>

<https://www.techtarget.com/searchnetworking/feature/7-types-of-networks-and-their-use-cases>

<https://prezi.com/oipbttvfjbpw/shared-resources-also-known-as-network-resources-refer-to/?need_sec_link=1&sec_link_scene=im>

<https://www.scribd.com/document/516039381/translate>

<https://www.google.com/amp/s/www.hostingadvice.com/how-to/best-file-hosting-services/amp/>

https://www.voxco.com/blog/why-data-integration-is-important/#:~:text=The%20main%20objective%20of%20data,sources%20into%20one%20coherent%20form..

<https://safetyculture.com/topics/business-process/process-integration/>

<https://www.oracle.com/ph/integration/application-integration/what-is-application-integration/#:~:text=Application%20integration%20is%20the%20process,and%20capabilities%20for%20an%20organization>.

<https://www.algiz-technology.com/what-is-integrated-infrastructure-and-why-should-you-care>

<https://azure.microsoft.com/en-us/resources/cloud-computing-dictionary/what-is-data->

<https://www.openlegacy.com/blog/process-integration>

<https://airbyte.com/data-engineering-resources/application-integration>

<https://www.ibm.com/topics/application-integration>

<https://www.tealhq.com/software/infrastructure-engineer>

<https://syncmatters.com/blog/what-is-data-integration#:~:text=Let’s%20explore%20some%20real%2Dworld,marketing%20and%20improved%20customer%20experiences>.

DigitalRoute. (n.d.). *Data integration*. Retrieved October 8, 2024, from https://www.digitalroute.com/resources/glossary/data-integration/