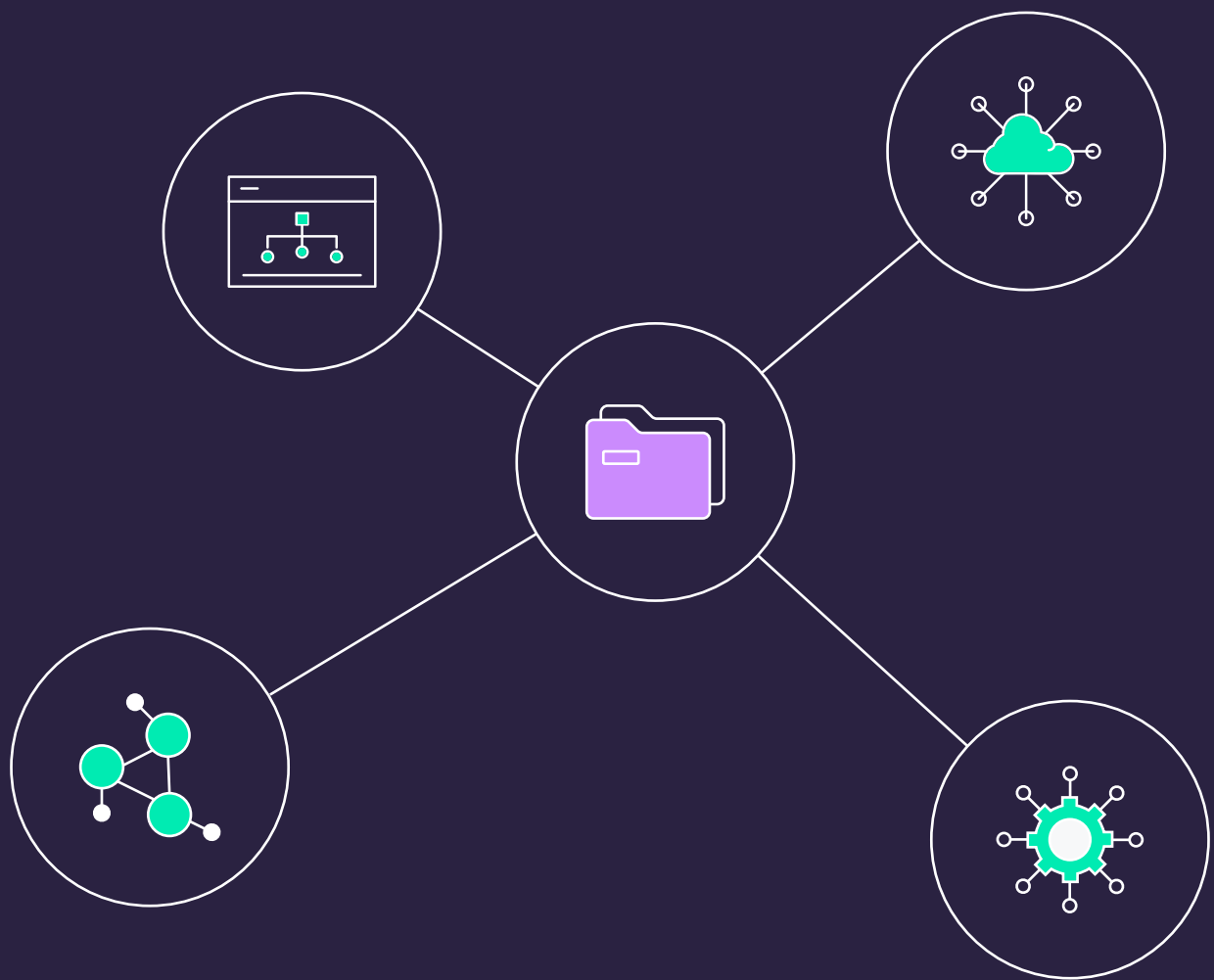


What Are the 5 System Integration Methods?



Integrate.io
The Ecommerce Data Platform

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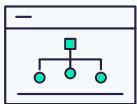
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01

INTRODUCTION

The five system integration methods you need to know about are:

1



Star integration: connecting each application to every other application.

2



Common data format: using a shared file format for exchanging information.

3



Vertical integration: linking together applications with a common objective or activity.

4



Horizontal integration: uniting applications and systems across the organization.

5



iPaaS: combining applications and systems with a dedicated integration platform.



As businesses grow to depend on a larger number of IT systems and software applications, these IT ecosystems are becoming more complex. According to Statista, organizations now use an average of [110 SaaS \(software as a service\) applications](#) within their IT environment—a massive increase from just eight SaaS applications in 2015. What's more, many of these organizations remain wedded to outdated on-premise and legacy systems that pose issues in terms of scalability, cost, and security.

To prevent this complexity from spiraling out of control, companies need a strategy to integrate their systems, business processes, data sets, and workflows. That's exactly the task of system integration: joining

multiple hardware and software components into a coherent whole, allowing them to communicate and share information. However, there are a number of different **system integration methods**, each with its own pros, cons, and use cases.

The question then becomes: Which system integration solution is right for your organization? This white paper is built to answer precisely that question. In what follows, we'll discuss the various types of system integration that you should know about—from vertical and horizontal integration to iPaaS. By the end, you'll be ready to select the integration tool that's best for your purposes, so that you can start enjoying the benefits of system integration for yourself.



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WHAT IS SYSTEM INTEGRATION?

As the name suggests, system integration is the process of more closely integrating or combining different systems and subsystems into a single cohesive unit.

There may be a wide range of systems, applications, and platforms involved in the system integration process. Just a few examples include:

- **CRM (customer relationship management)** for keeping track of a company's interactions with its customers and potential customers.
- **ERP (enterprise resource planning)** for automating, optimizing, and streamlining processes in many different business functions, from HR and finance to project management and logistics.
- **Business intelligence (BI) and analytics** tools that dig through raw data to find hidden trends and valuable insights, helping with data-driven decision-making.

- **Ecommerce platforms** that manage a company's online storefront.
- **Cloud and SaaS applications** for many different functions: customer support, email marketing, project management, software development, etc.

System integration is important because it helps break down the data silos that tend to naturally crop up within an organization over time. Data silos are data sets or repositories that are available only to a single person, team, or department, even when other people could benefit from having access to them. By consolidating the various systems and technologies in your IT environment and enabling rapid, easy communication, it's much more difficult for data silos to occur and persist in the long run.

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SYSTEM INTEGRATION VS. DATA INTEGRATION

When reading about system integration, you might encounter a related yet separate term: data integration. This distinction is also known as enterprise application integration (EAI) versus enterprise data integration (EDI).

Both system integration and data integration share a common goal: making an organization's enterprise data more accessible and actionable for the people who need it. However, the difference between system integration and data integration is subtle but important:

- The data integration process typically deals with data sets at rest (i.e., information that has already been created and stored in a designated location). These data sources are then extracted, transformed as necessary, and loaded into a target repository.
- System integration, on the other hand, typically handles real-time communication between two or more unrelated systems

or applications. For example, a system integration adapter might connect an on-premises legacy system with its equivalent version in the cloud, enabling the two disparate entities to act as a single unit while a cloud migration takes place.

Related Reading: [The Five Types of Data Integration](#)

Smaller companies that suffer from disconnected applications can use system integration for a quick fix, enabling real-time exchange of information. For heavy-duty use cases with large datasets and historical data, however, a data integration tool will likely be necessary. Data integration platforms extract information from multiple internal and external sources, transform this information to improve its quality and accuracy, and load it into a destination such as a [data warehouse](#). This process is known as [ETL \(extract, transform, load\)](#).

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THE BENEFITS OF SYSTEM INTEGRATION

Consider the example of a new employee who starts work at a company. Initially, the employee's record might exist only within the company's human resources software.

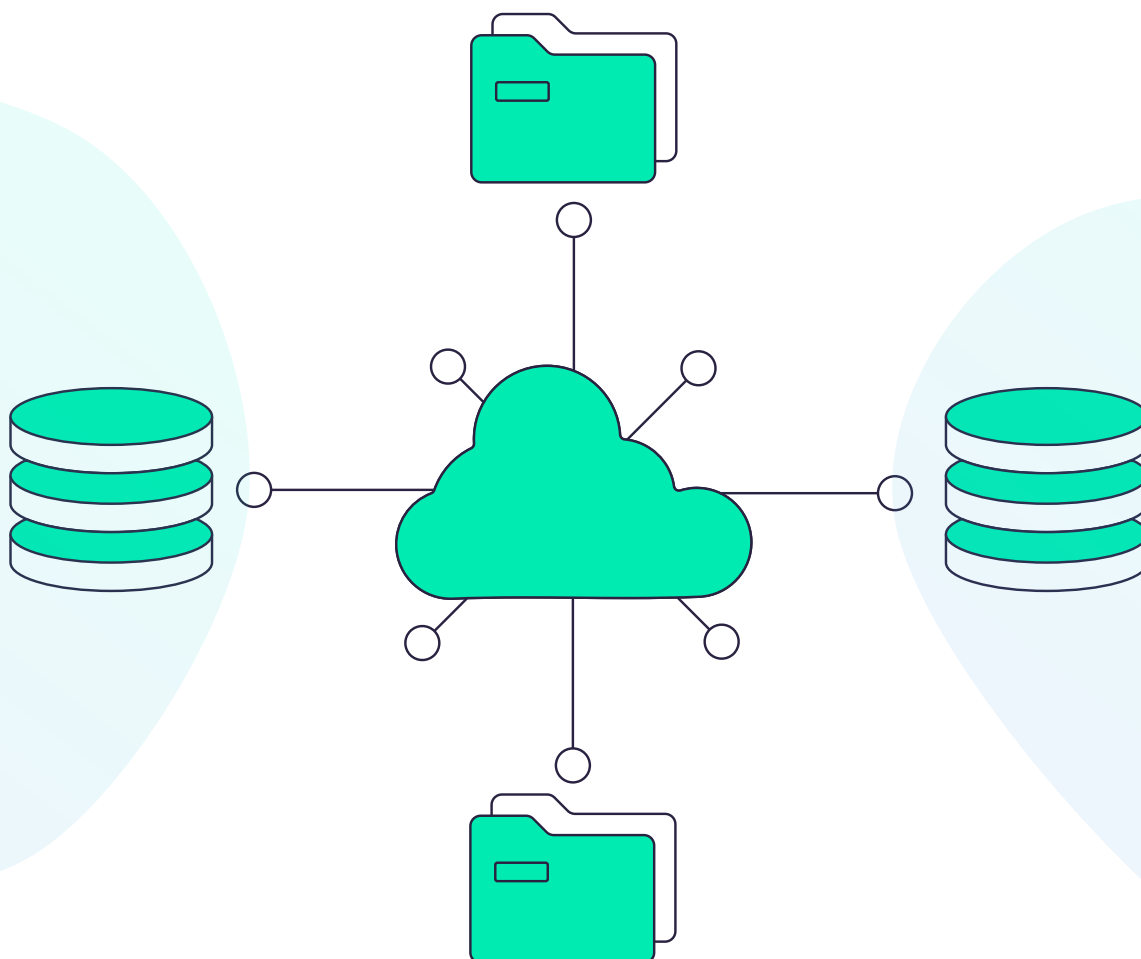
However, this employee entry also needs to be propagated to other systems, such as payroll, benefits, and project management. Thanks to system integration, this data can be quickly and automatically exchanged with the right applications, sparing users from the slow and error-prone process of manually copying the information.

System integration offers benefits such as:

- **Saved time and effort:** For all but the most trivial examples, manually copying data between different systems is a waste of human employees' time and effort. System integration frees up these employees to spend time on more important, higher-level, revenue-generating activities.
- **Breaking down data silos:** Data silos are the enemy of data exchange and sharing ideas and can hold your organization back from reaching its full potential. Bringing your applications and IT systems under one roof helps encourage a spirit of collaboration.
- **Greater functionality:** Two (or more) applications combined can be greater than the sum of their parts, forming a single harmonious whole. For example, multiple financial software applications (bookkeeping, payroll, budgeting and forecasting, etc.) can share information between them, making the organization's finance department more effective and productive.



Thus far, we've defined what system integration is and the advantages of integrating your IT systems. The next question is: how can you perform system integration? In the rest of this white paper, we'll go over five types of system integration in detail, so that you can choose the right method for your integration needs.



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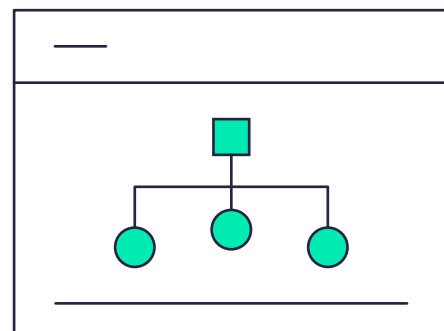
SYSTEM INTEGRATION METHOD #1: STAR INTEGRATION

The first system integration method we'll review is star integration, also known as “point-to-point integration” or “spaghetti integration.”

These evocative names illustrate the basic idea behind this integration method: each system in the larger network is connected to every other system, similar to how every point in a six-point star can be connected to every other point.

Star integration is perhaps the simplest type of system integration conceptually. Instead of thinking deeply about which systems need to be connected for the IT ecosystem to function, star integration simply links them all together. These connectors exist independently and in isolation from each other. For example, if we have three applications, A1, A2, and A3, the link between A1 and A2 is not affected if the link between A1 and A3 (or A2 and A3) goes down.

This fact can mean that star integration is a highly available method of system integration, since there are potentially multiple paths for data to travel between two applications. In addition, communication between two different systems will be fast since each pair of systems has a direct route between them.



However, star integration also comes with several major disadvantages. These include:

- **Significant time and cost:** Because each application has its own data format and communication protocol, the reusability of each custom-built connector is limited. This means that developers usually have to invest substantial time and effort into building each connector individually. The cost of star integration expands rapidly as more systems and applications are added to the environment.

- **Data management challenges:** Custom-built connectors and modules often need to be updated as the underlying application changes. Star integration uses a single connector for each link between two systems, which means you will have to update a large number of integrations even if a single application is modified.

- **Lack of flexibility:** The point-to-point approach of star integration means that there is no centralized hub for managing and overseeing the integration process. This makes the entire structure rigid and inflexible, and the cost of rearranging the network's layout or adding new systems grows exponentially.

In summary, star integration may be an appropriate integration approach for quick connections between a few applications. However, it rapidly becomes impractical as the size of your IT environment grows.

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SYSTEM INTEGRATION METHOD #2: COMMON DATA FORMAT

One of the greatest disadvantages of star integration is the tremendous amount of work required to integrate each pair of applications.

Since each software application could be built by a different third-party vendor, there's no guarantee that two separate applications or systems will be able to understand each other out of the box.

To help lessen this pain point, an alternative **system integration method** is to use a common data format. Two applications need to speak the same “language” in order to comprehend the information that they send each other. Without a way to interpret this data, both sides will be unable to read the other side's information as anything more than an endless stream of 0s and 1s.

A common data format is a shared “language” that tells applications how to decipher raw data from another system and turn it into meaningful information. For

example, in the world of financial software, there are multiple shared data formats in which different applications can read and/or write data. These include OFX (Open Financial Exchange), QIF (Quicken Interchange Format), and even CSV (comma-separated values) files.

Financial applications are far from the only systems and software that use a common data format. XML and JSON formats are two of the most widely used human-readable notations that enable applications to send and receive information in a structured manner.



Notably, the applications themselves do not necessarily have to include support for these common data formats. Third-party enterprise application integration (EAI) systems can convert between a software application's proprietary data format and a common or independent format that can be easily transformed for use by other applications.

The greatest advantage of using a common data format is that its complexity is significantly reduced when compared with

system integration methods such as star integration. Instead of building point-to-point connectors between each application, users can simply convert an application's output into a shared, mutually comprehensible schema. The disadvantage of this integration approach is that a shared data format may not always be available for the connections that users want to establish between applications.



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SYSTEM INTEGRATION METHOD #3: VERTICAL INTEGRATION

In the world of business, the term "vertical integration" refers to a strategy in which a company owns multiple steps along the supply chain within a single industry, avoiding the need to rely on third-party vendors and partners.

One popular example of vertical integration is Walmart: the company manufactures many of its own products (such as clothing, food, and consumable goods) and then sells them in-store at Walmart outlets.

The term “vertical integration” is also used in system integration to describe a similar strategy. With the system integration method of vertical integration, multiple applications and subsystems are combined to form a more coherent unit, operating with a single purpose.

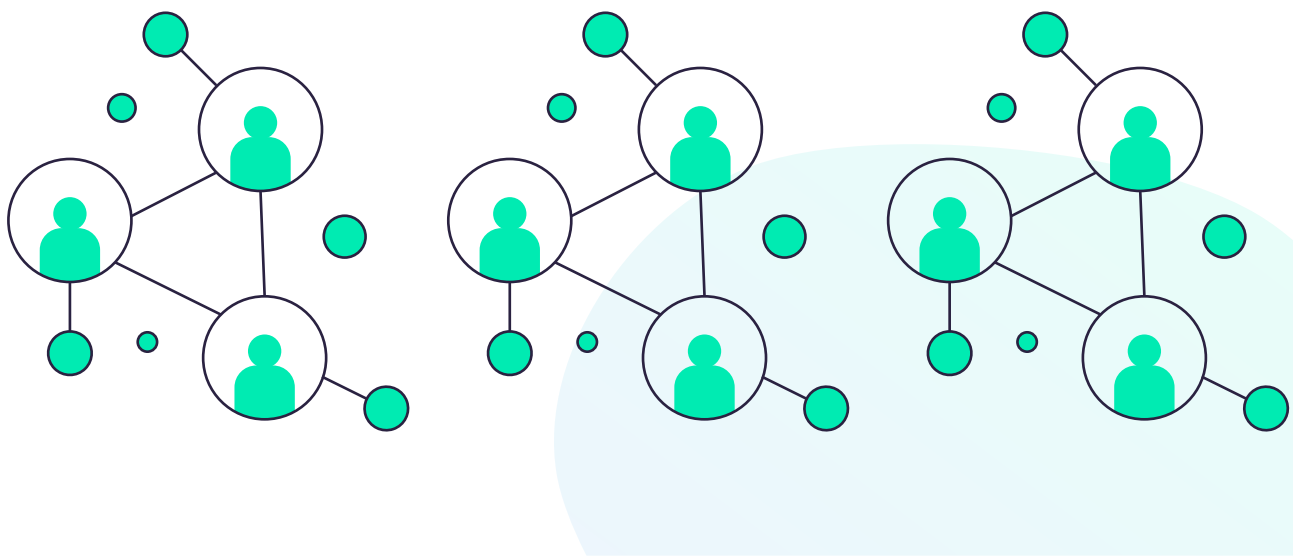
In the field of healthcare, for example, a vertical integration might be formed by joining multiple systems that all work toward the same goal of medical imaging:

- This would first need to include EHR (electronic health record) software that tracks a doctor’s recommendations for a patient to undergo a scan.
- The next step would involve creating an integration between the EHR system and the PACS (picture archiving and communication system) technology that is responsible for generating the image.

- The final piece of the puzzle might be to link the EHR and PACS systems with medical diagnosis software that uses artificial intelligence to help physicians detect any issues present in the image.

The larger systems or “packages” of functionality created by vertical integration are known as silos (not to be confused with the data silos discussed above). The greatest benefit of vertical integration is that it combines previous standalone tools into a greater whole with a clear function and purpose.

On the other hand, vertical integration also comes with a downside. Like data silos, vertical integration silos are usually only suitable for the needs of a single team or department (hence the name) and do not share data with other silos. This means that an organization may need to build many different integration silos in order to achieve an effective enterprise-wide system integration.



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SYSTEM INTEGRATION METHOD #4: HORIZONTAL INTEGRATION

CDC is a method that identifies any changes made to data inside a database.

Just as there is an analogy between vertical integration in business and vertical integration in IT, so too is there a parallel with horizontal integration. In the world of business, a "[horizontal market](#)" is a market that spans multiple industries or sectors or sells to a wide range of customers. For example, automotive pioneer Henry Ford also purchased the Detroit, Toledo & Ironton Railroad as part of his broader interest in the transportation industry.

With IT systems, however, “horizontal integration” describes the **system integration method** of uniting multiple vertical silos within an organization, enabling them to communicate with each other. This helps solve the main problem with vertical integration: the inability of different silos to exchange information.

Traditionally, horizontal integration has been implemented using an [enterprise service bus \(ESB\)](#). This is a communication model that creates an overlying application layer, with defined protocols, business rules, and standards that govern how different software and systems share data. Each application connects to the ESB using an adapter at a single connection point (unlike the tangled point-to-point mess of star integration).

Compared with star integration, then, horizontal integration dramatically slashes the number of connectors needed for all applications to communicate with each other. Instead of defining a point-to-point connection between each pair of applications, horizontal integration simply requires a single connection per application:

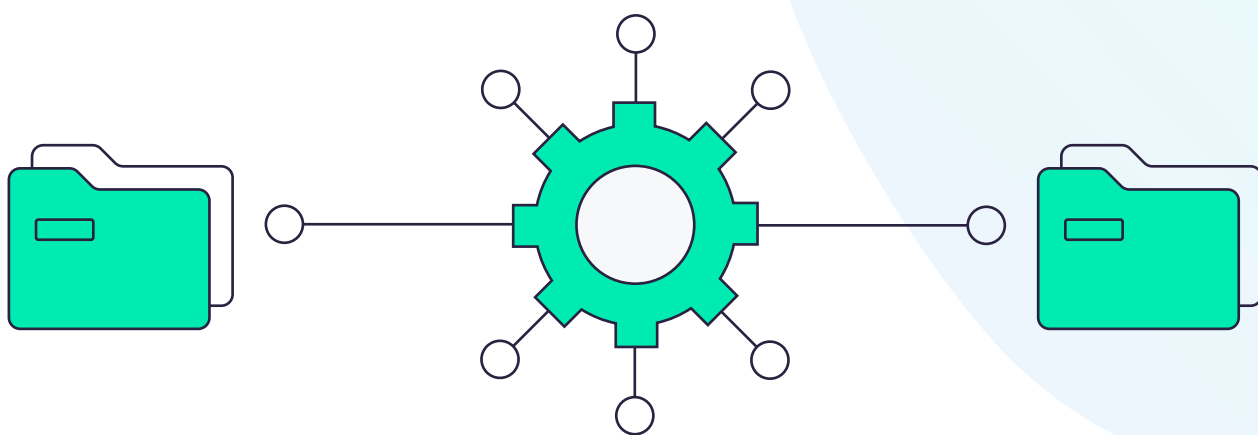


between the software itself and the ESB.

Thus, if the application changes in the future, requiring an update to the integration architecture, only a single connector needs to be modified.

The greatest advantage of horizontal integration is that it is a highly flexible and future-proof integration approach. However, this comes at the cost of greater complexity and overhead when first designing the system. In addition, the central ESB is often a single point of failure: if it goes down, the entire system will likely suffer an outage.

Today, the benefits of horizontal integration have made it the **system integration method** of choice for most organizations. As we'll discuss in the next section, however, the concept of an ESB in horizontal integration has largely been replaced by a more modern alternative: that of the iPaaS.



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SYSTEM INTEGRATION METHOD #5: IPAAS

Last but not least, iPaaS (integration platform as a service) is perhaps the best practice for system integration in today's IT landscape.

The term iPaaS comes from other “as a service” offerings such as SaaS (software as a service), in which a cloud-based software tool is provisioned to users remotely over the internet.

An iPaaS solution is a cloud-native hosted software application that helps users integrate their applications, services, processes, and data across both on-premise and cloud environments. iPaaS software can help applications communicate in real time, and some iPaaS tools are also equipped with ETL functionality, moving data into a centralized repository such as a data warehouse. The iPaaS provider handles issues such as data security, data governance, and regulatory compliance behind the scenes.

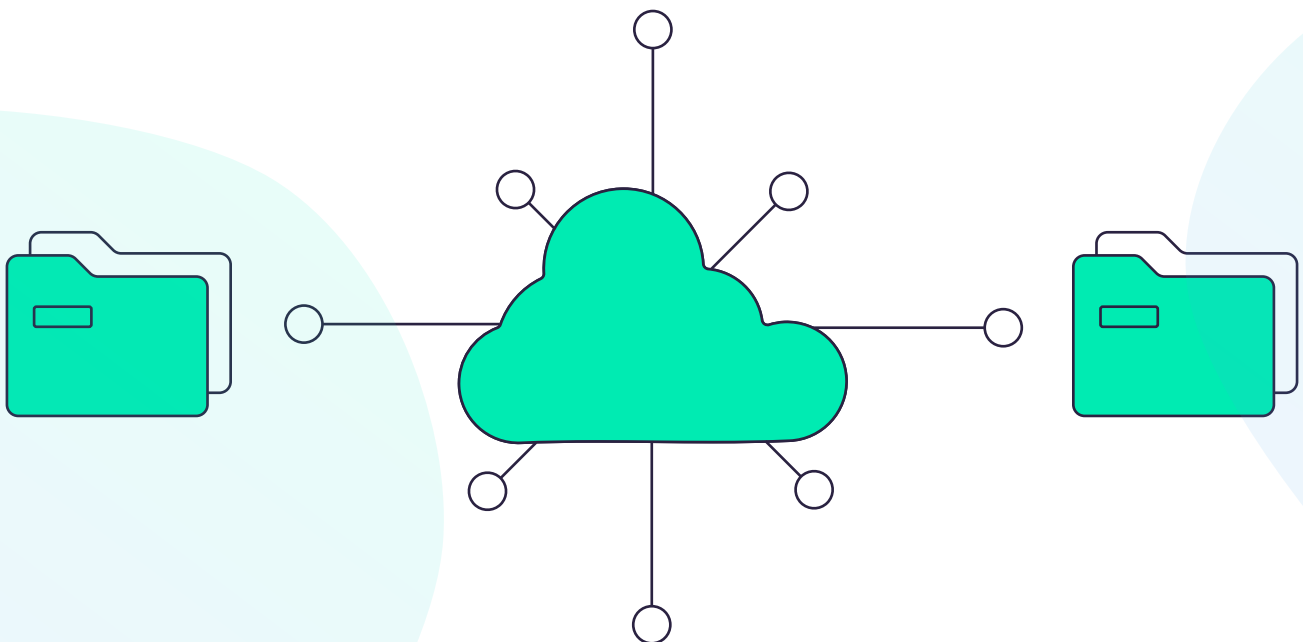
For organizations that require many different application and system integrations, iPaaS is likely the best system integration method.

The advantages of an iPaaS solution include:

- **Diverse set of connectors:** iPaaS software comes with a library of pre-built, plug-and-play connectors and adapters that companies can use out of the box. The list of connectors will vary depending on the provider. Some iPaaS solutions also have a REST application programming interface (API) connector that allows users to link up with any service with a REST API.

- **Simplified technology stack:** iPaaS can be a lifesaver for businesses without a large IT team capable of building and maintaining the required integrations. The iPaaS platform brings together all of these connections under one roof and deals with the messy technical work behind the scenes, significantly reducing the burden on your IT department.

- **Large number of use cases:** The flexibility of iPaaS tools means that they can be used in many different ways. The possibilities include integrating legacy on-premise systems, performing data integration, connecting with IoT (Internet of Things) devices, establishing data flows between third-party vendors and partners, and more.



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HOW INTEGRATE.IO CAN HELP WITH SYSTEM INTEGRATION

iPaaS and other data integration platforms are excellent system integration methods, helping to streamline the process of extraction, data transformation, and loading into the target data warehouse. With the right integration software, businesses can dramatically simplify the integration process—so what should you look for when choosing the best data integration software?

Integrate.io is a feature-rich, robust, and user-friendly ETL and data integration platform that specializes in Ecommerce businesses. The no-code, drag-and-drop visual user interface makes it easy for anyone to define complex real-time data pipelines through the power of automation. What's more, Integrate.io comes with more than 140 pre-built connectors and integrations for the most popular data sources, so that you can instantly link together your IT ecosystem.

The Integrate.io platform is packed with functionality to enable the integration process. Integrate.io's FlyData CDC (change data capture) feature automatically detects only those records that have changed since your last integration job, saving you a great deal of time and effort. Meanwhile, Integrate.io's reverse ETL feature lets users push data out of a centralized repository (like a warehouse or data lake) and into third-party systems for easier data access.



We hope that you have enjoyed reading this whitepaper.

If so, be sure to [check out our other Whitepapers](#) related to "[What Are the 5 System Integration Methods?](#)".

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