



GHOST LABS

WHITE PAPER

www.ghostnodes.com

GHOST – Gateway Host Nodes

A paradigm shift in integration standards - by Ghost Labs AB

Integration has become more difficult to handle, further, integration is one of the core capabilities to succeed in digital business. Integration has also become a capability that drives huge costs. When enterprises extend business globally, adds new applications and more computing paradigms, e.g. B2B growth, cloud adaptation (SaaS), social, mobile, and IoT/IIoT, just to name a few.

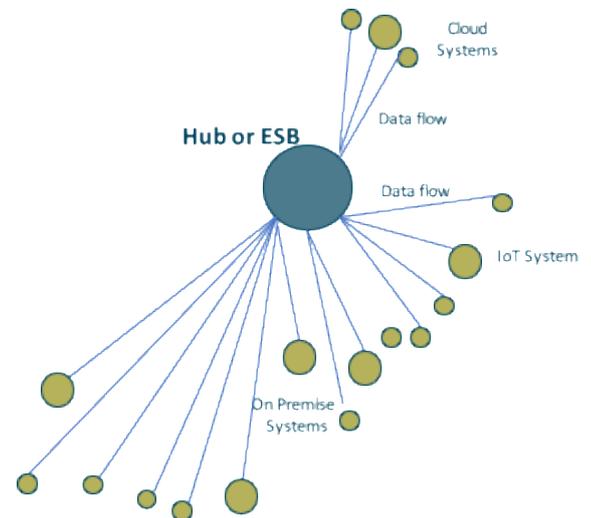
The old integration standards are not fit for purpose anymore.

Old Integration Standards

Addressing the increasing integration challenges above, the present and centralized integration standards such as Enterprise service buses (ESBs) and Message brokers have limitations.

This resides partly on the integration logic for solving an integration problem that is highly distributed in its nature, by a centralized approach, which is even further accelerated when enterprises try to transform into digital business. Integrating big data or any things from human, machine and applications is emerging as the greatest challenge that enterprises face today.

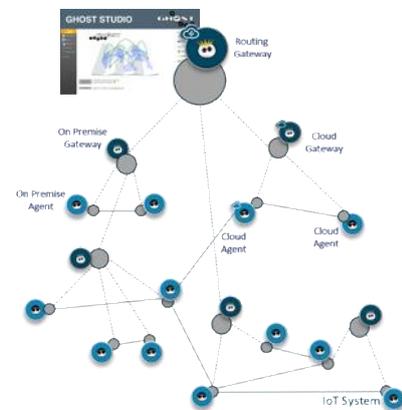
Hence, a traditional centralized integration approach fails to deliver on implementation speed, cost, operations and control, due to its complexity.



Example of the old integration standard

New Integration Standards

A distributed architecture is a prerequisite to support innovation and an explorative rapid development style. This architecture also ensures low cost when scaling. Compared to a centralized approach, a truly distributed approach is much more cost-efficient. It also supports reliable end-to-end operational monitoring, control and governance capabilities.'



Example of the integration paradigm



Why was GHOST invented?

The greatest challenge for digital business is *smart integration of everything*, from legacy IT/OT systems to IoT devices. Further, data security and central device management of distributed systems landscapes are fundamental. New digital services also need to be designed, tested, and scale in a fast manner. Last but not least, the Total Cost of Ownership of digital platforms must be in line with the value they deliver.

GHOST makes integration and creation of distributed digital services simple, fun and scalable!

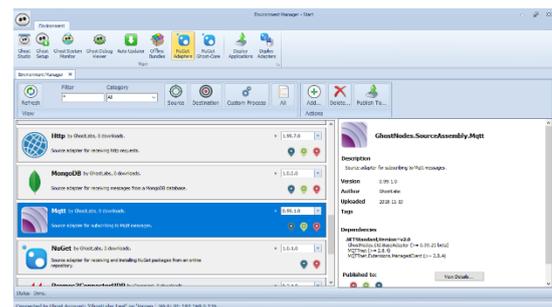
Digital experts, architects and developers become heroes when able to deliver digital business solutions with outcomes such as:

- Infinitely scalable integration of anything, anywhere, anytime
- Distributed services including advanced analytics (edge AI) with remote self-service updates
- Central device and life-cycle management, security & control of entire system integration landscape(s)
- Total Cost of Ownership that is affordable and in line, with the value that the digital platform delivers

GHOST can be used as the framework to create integrations and setup of nodes collecting data in a distributed landscape (also including partner and cloud environments). These nodes are key in the setup which is managed from a central configuration, development and control tool (the GHOST Studio).

From this central tool, the connection logic is then automatically pushed out in the

distributed landscape as close as possible to the actual data sources. This allows point-to-point data flows that ensure the shortest and most efficient data transfer between data sources and applications. In addition to transport capabilities, the nodes can include adapters and processors that could be configured to hold algorithms for managing mapping, translation, aggregation and any business rule and logic that is desirable to place close to the data source before or after a data transfer. This minimizes incidents since the data is only translated once and is flowing point-to-point with the relevant data only.



The adapters and processors ensure that data and information are processed and distributed to the right recipient in a network similar to the principles used in the Internet Protocol.

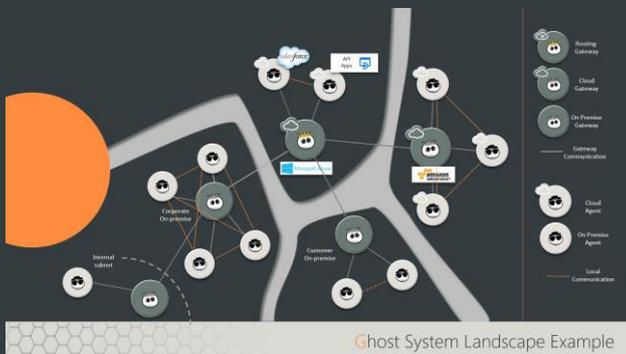
Adapters distributed close to data sources can hold business rules and can also easily be configured through an open API. This allows for GHOST to be a key component in IoT/IIoT scenarios and Service Enablement Platforms, in addition to handle classical integration scenario setups, complementing or replacing integration solutions based on centralized architectures.



State of the art Architecture

The distributed and network-based architecture is state of the art in which the distributed solution will continue to function even if parts of the network or the system malfunctions. The solution can run entirely

in the cloud, within the company's or partner networks, or as a hybrid (a combination of cloud and on premise).



State-of-the-art integration architecture by GHOST

GHOST monitors each step of the integration chain with alarms when there is a deviance from the predetermined thresholds. This means that the failure of the integration chain can quickly be found, notifying the right people with the right skills for the job, or secure e.g. an automatic shutdown of a machine in real time.

TCO and Implementation Speed

Using the GHOST platform, TCO (Total Cost of Ownership) can be reduced by 70%. More than 50% better efficiency can easily be gained in the design, configuration and deployment of integrations.

GHOST is designed to run on existing hardware with a small footprint of the agents. The inbuilt reliable and secure data transfer notably reduces TCO compared to a more complex centralized solution.

The expected evolution of the Integration Platform Industry - Hybrid Integration Platforms (HIPs)

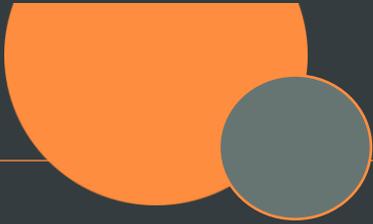
The greatest challenge for digital business is connectivity and smart integration of everything, from legacy IT/OT systems to IoT devices, regardless of location, and handling both static and high frequency streaming data.

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GHOST has proven strong capabilities of a Hybrid Integration Platform with:

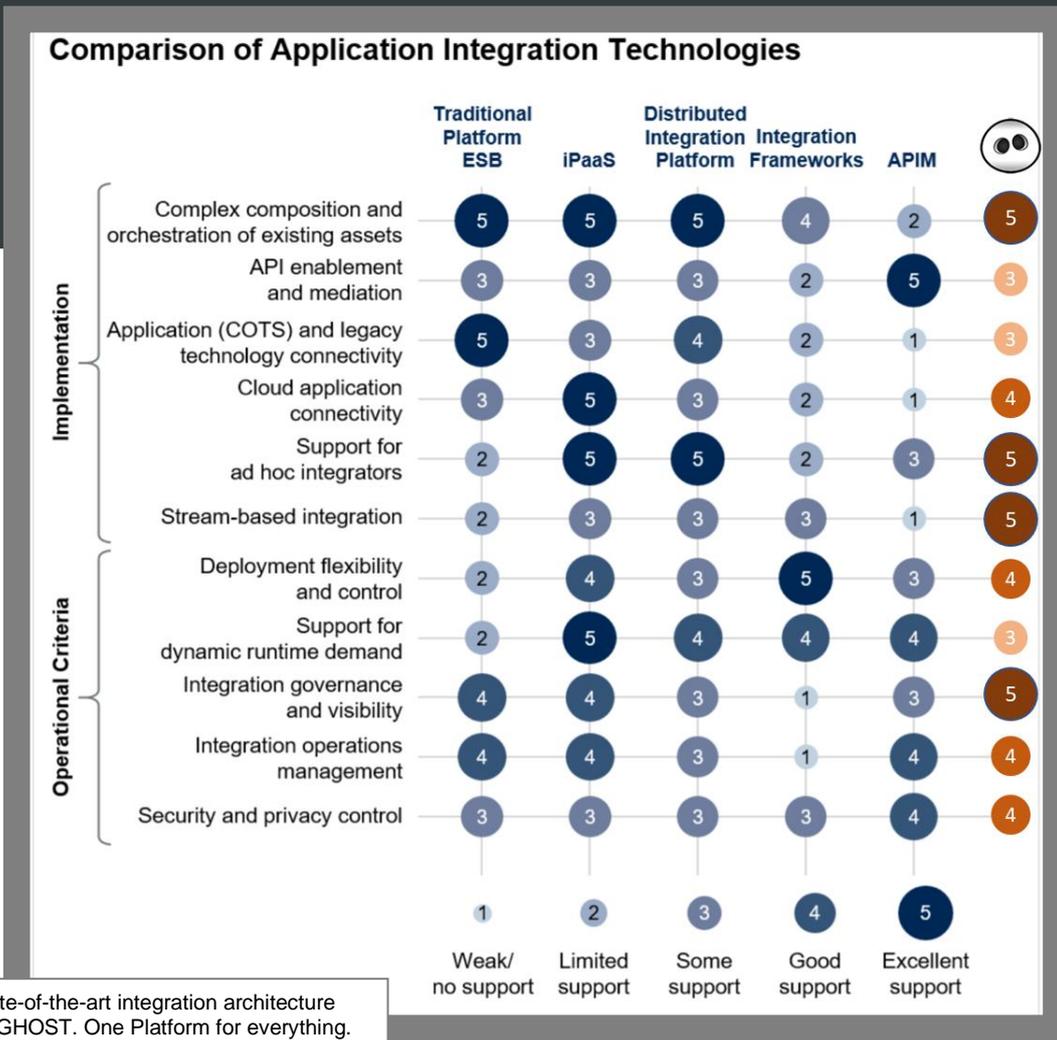
- Infinitely scalable integration of anything, anywhere, anytime
 - Use existing HW infrastructure
 - Shared connector/adaptor community
 - Flexible with strong support to build unique connectors and adapters
 - Design, test, and operate in one environment



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 - Design, test, and operate in one environment
- Distributed services including advanced analytics (edge AI) with remote self-service updates
 - Advanced analytics (AI) at the edge
 - Combine legacy & streaming data

"The GHOST hybrid integration capabilities enable us to only use a single instead of multiple integration solutions to fulfil our digital service platform requirements. Things like the very small footprint, the graphical user interface, flexibility to connect any device, as well as support for 2-way communication, edge computing, cloud, and strong security aspects made this the obvious choice in comparison with every other solution we evaluated."

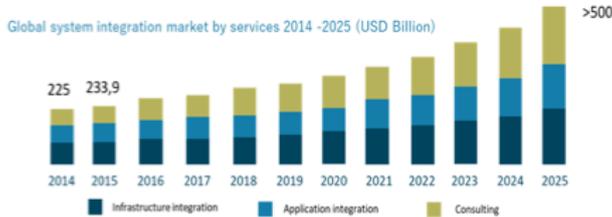
Nevzat Ertan, Chief Architect, Sandvik Coromant AB





The Old-School Integration Value Chain

Because of new global IT infrastructures and decentralization of business processes e.g. IoT applications and Cloud solutions, the integration industry is expected to have a turnover of more than 500 billion USD by 2025.



Expected turnover and distribution of revenues in the integration industry value chain

The business logic in the existing value chains is not delivering optimal value to the end-customers. The end-customer defined as the organisation with integration needs, everything from start-up companies in the Finance industry to large enterprises in the manufacturing, logistics, healthcare, or actually, any industry. Typically, the companies combine internal resources with consultants, whom creates digital strategies and plans, including target architectures for the future IT-platforms with the purpose to deliver business services as efficient as possible. The company then acquires a software integration platform either by up front license investments, or as a service, from a software company. Typically, the end-customer then combines internal resources and consultants, whom are partners with the software company that implements and develops

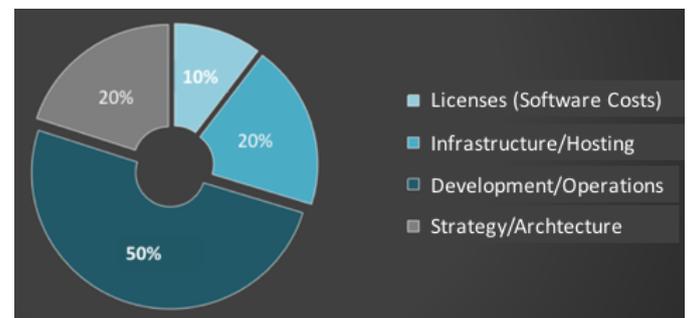
Integrations supporting the business to deliver more efficient services. Last but not least the company work with operations and maintenance, most often by a combination of internal resources and consultants.

This value chain creates lock in effects, where the end customer pays way too much money, for limited deliveries and values.

The established software companies deliver steam-engines and the consultant firms shovels coal by "paid by the hour" revenue models. This is a fascinating paradox, since the software industry value chain claims to sell digital business transformation, while the majority of these firms work with 30 years old business models.

In average, the total cost per integration is 6000-7000 USD per integration flow per year divided in these four cost categories:

- Strategy and Architecture (20%)
- Infrastructure/Hosting (20%)
- Development/Operations (50%)
- Software Costs (e.g. licenses (10%))



The Total Cost of Ownership distribution of integrations.



New business models for the industry convergence is the next step.

Through an investigation of the market and benchmark data from e.g. the analysis companies above there are four conclusions:

1. One of the greatest challenges for digital business is - *smart integration of everything*
2. The total turnover in the software industry value chain is quite extreme
3. The existing value chain, whom benefits from this extreme turnover, does not deliver on promise – to high costs related to the value of their deliveries.
4. Finally – you need a HIP – Hybrid Integration Platform approach, where you can combine, truly distributed and centralised approaches in one architecture. The most affordable way to do this is to use one vendor that combines and delivers Integration Strategy, Architecture, Infrastructure/Hosting, development, operations and software costs in one package

This is actually nothing new, by analysing other value chains that has been disrupted by innovative technologies and business models, e.g. the music industry, there are some typical phases:

- First there are new disruptive technologies, in the music industry case, streaming technologies.
- Next there are newcomers entering the market with new business models – often

freemium business models, low or no entry cost, then a subscription fee for the service: in an all you can eat model.

- Finally, the old value chain is either commoditized or gone.

This is the pattern we can expect to see in the software industry value chain, or IT ecosystem. There is also one further important dimension to consider. Centralization vs Distribution. Here, we can also draw conclusions by looking at the past. In the late 80s the software industry was centralized. The main-frame computer companies were flourishing. Due to new technologies, a new paradigm entered, with more distributed, client-server-based approaches. Many of the main-frame computer companies disappeared. Some of them transformed and new companies like Microsoft was born. The consultant firms needed to adapt and work with the new competencies, however they did not change their business models. If we analyze where we are now, we can identify the same pattern. But now the centralized approach is named as the Cloud. The disruptive technology will be truly distributed capabilities a.k.a edge computing that can be governed and managed centrally, or, if you need, combined, which will be the most common pattern, the hybrid pattern.

During the last 7 years we have implemented this approach and scientifically documented it



Documented Customer Cases

Below we have divided the documented value into three important stakeholder groups.

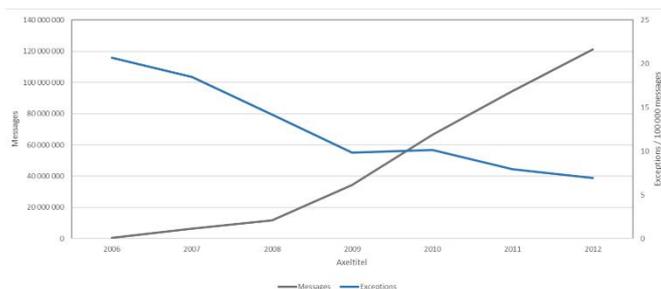
- Documented values for the End Customers
- Values for the Consultants companies that manages to transform them-selves or the new entrants to the market
- Documented values for the Craftsmen, the integration and solution architects and the developers

Documented End Customer Values

Benefits in a large industrial manufacturing company replacing a centralized integration platform with a distributed integration setup shows:

Overall operations & maintenance costs reduced > 70%

- Integration cost in new projects reduced >50%
- New Integration implementation time reduced >30% due to less complexity and more configuration & reuse (less coding)
- Reliability/Quality: No of faults reduced >70% (#exceptions/100000 messages) due to improved monitoring plus identification & handling of exceptions



Reliability/Quality: 7 years evolution of transaction volume and message exceptions in a large industrial company

GHOST gives us an essential and fundamental component for reaching our secure target architecture, replacing BizTalk for legacy integrations, connecting systems for data transfer for our new data warehouse, and building a reliable service enablement platform with IoT capabilities for smart mobility services for our customers.

Anders Bergström, Chief Architect,
Transdev Sweden AB

*GHOST complements our Azure services and is fundamental in allowing us to collect enormous amounts of data from systems, machines and devices in a secure manner, and also enables us to distribute advanced analytics services (AI) to the edge. This truly transforms our business as shown at the MS Build Conference,
https://youtu.be/Ja5_Xe9dX9A*

Nevzat Ertan, Chief Architect,
Sandvik Coromant AB

*Great integration platform
Very easy to use integration platform that has made the digitalization of our operational process work in a faster pace. This in turn has made it easier for us to respond to our customer's requirements in a more agile way.*

Jakob Lindblom, Head of Business
Development, Sodexo AB (Hjälpmedel)



Documented values for Consultants companies that manages to transform?

The *consultant by the hour* companies that manages the transformation to deliver value by e.g. integration as a service models, with recurrent revenue model are the future winners in the IT business eco-system. The companies that manages the transition to selling platform as a service. The business case is very clear.

- It is a fact that the consultant fees have been quite stable during the last decades. Consultant by the hour revenue models are now, per definition commoditized.
- From the end-customer view there are already examples of much higher values delivered by new business models and business relationships with the end-customer.

Finally, since GHOST is truly distributed, there are no central cost-drivers in the solutions delivered. This opens up for radical changes in the business models.

Craftsman value

The craftsmen are the ones that should be honoured! In the end of the day, digital experts, architects and developers should be the true heroes, without them there will be no digital business solutions at all. To honour these stakeholders, a lot of emphasis has been put on features such as:

Simple & Scalable Integration

- Use existing HW infrastructure
- Shared connector/adaptor community
- Design, test, and operate in one environment
- Automatic exception handling – logging messages at runtime

Central Life-cycle Management & Control

- Device control and real-time recovery
- Automated self-service updates
- Security and encryption end-to-end
- Multi-firewall traversing with no single point of failure
- Automatic documentation of integrations – skip 80% of the boring job of documentation

Craftsmen quotes

Great platform

Ghost is a very modern and easy to use platform when it comes to configuring integration flows. It manages a variety of tasks, from the simplest file transfer integration to complex integrations with different kinds of data conversion and parallel flows :-)

Quote from azure marketplace

Thumbs up!

GHOST easily integrates, refines, and manages large volumes of integrations from all types of systems, applications, and devices (IoT).

Quote from azure marketplace

Where to start the Journey?

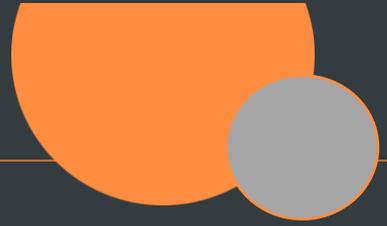
GHOST can easily be managed by companies and organizations themselves, or supported by GHOST implementation partners.

Start your GHOST experience here:

<https://ghostnodes.com/gettingstarted/>

or here:

https://azuremarketplace.microsoft.com/sv-se/marketplace/apps/ghostlabsab1584979868765.ghostnodes_testoffer?tab=Overview



*Haunts complexity
builds business
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