



AspenTech Inmation™ Total Value of Ownership Analysis

Introduction

AspenTech Inmation was developed based on a detailed understanding and strong appreciation for the challenges associated with process industry companies managing OT data in Industry 4.0. The AspenTech Inmation core service establishes connections to various connector services, collecting data from several endpoints. It processes data and brokers communication between connector services and the data lake repository.

AspenTech's Inmation digital ecosystem and operational technology (OT) expertise combined with AspenTech Inmation's integrated software platform will enable real-time information management across operations, process control and IT systems. The platform is expected to further enable customers to realize a measurable return on their digital transformation efforts.

To support this proposition, AspenTech has determined the potential Total Value of Ownership (TVO) across the implementation of three distinct options for its customers: Enterprise-wide Historian, Enterprise-wide Data Lake on-prem and Enterprise-wide Data Lake - Hosted. The TVO model was developed using a baseline organization given a manufacturing organization with \$1B revenue and 15K employees. The qualitative and quantitative TVO analysis yielded the results that follow.



Industry 4.0 and manufacturing agility objectives are driving the need for IT/OT interoperability

Industrial manufacturers are depending on the use of unstructured data sources for decision making across the business. The issues concerning IT and OT integration are a key obstacle to successfully scaling various Industry 4.0 initiatives.



Achieving greater synergies through enabling IT/OT interoperability

Achieving IT/OT synergies is beyond the current capabilities of many organizations, due to the unfamiliar data types, legacy environments, higher velocities and volumes, lower latency requirements, and different interface types in OT environments.



CIOS are interested in the access to OT data for risk reduction and the opportunity value of data

Some examples of the use cases include: product quality (detecting variations in production machine performance) plant reliability (detecting anomalies and degradation), predictive maintenance (tracking and forecasting failures, faults and degradation).



Cloud-based solution supports scalability and cost optimization

Cloud-based solution offer more benefits such as scalability, access to advanced data analysis and processing, newer cloud- native capabilities (e.g., ML/AI or pre-built predictive models) and technical flexibility (e.g., infrastructure-as-a-code delivery model and security automation).



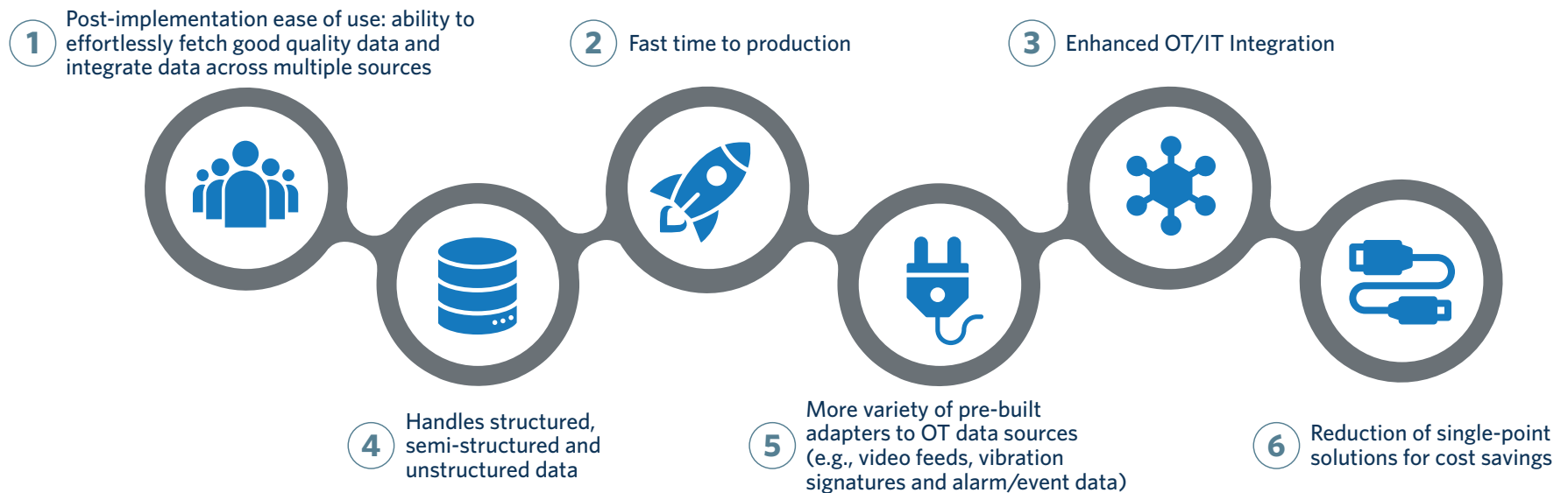
AspenTech Inmation enables quick access to structured and unstructured data

AspenTech Inmation acts as an OT data lake within the logical data warehouse (LDW) providing easier integration for OT/IT needs through pre-built data integration capabilities to combine or share data, both structured and unstructured (e.g., complex data such as alarm/event data, vibration signatures, & video feeds), between the two different worlds (IT vs. OT).

IT/OT interoperability is becoming key to driving synergies

The IT/OT integration involves the convergence of manufacturing systems controlling physical events and processes with back-end hardware and software for processing and communicating information. The interoperability between Information Technology and Operational Technology offers opportunities to drive greater business value for enterprises. AspenTech Inmation supports faster and easier integration within OT and across IT/OT to combine data between the two different worlds.

AspenTech Inmation aggregates global operational data from across the enterprise into the Inmation digital ecosystem to create an OT data lake. The intersection of OT and IT unlocks the value of engineering knowledge to make more insightful decisions about products, facilities and systems during their development and service life. AspenTech Inmation offers customers an improved data management capability through the following six advancements that help span the IT/OT needs of customers.

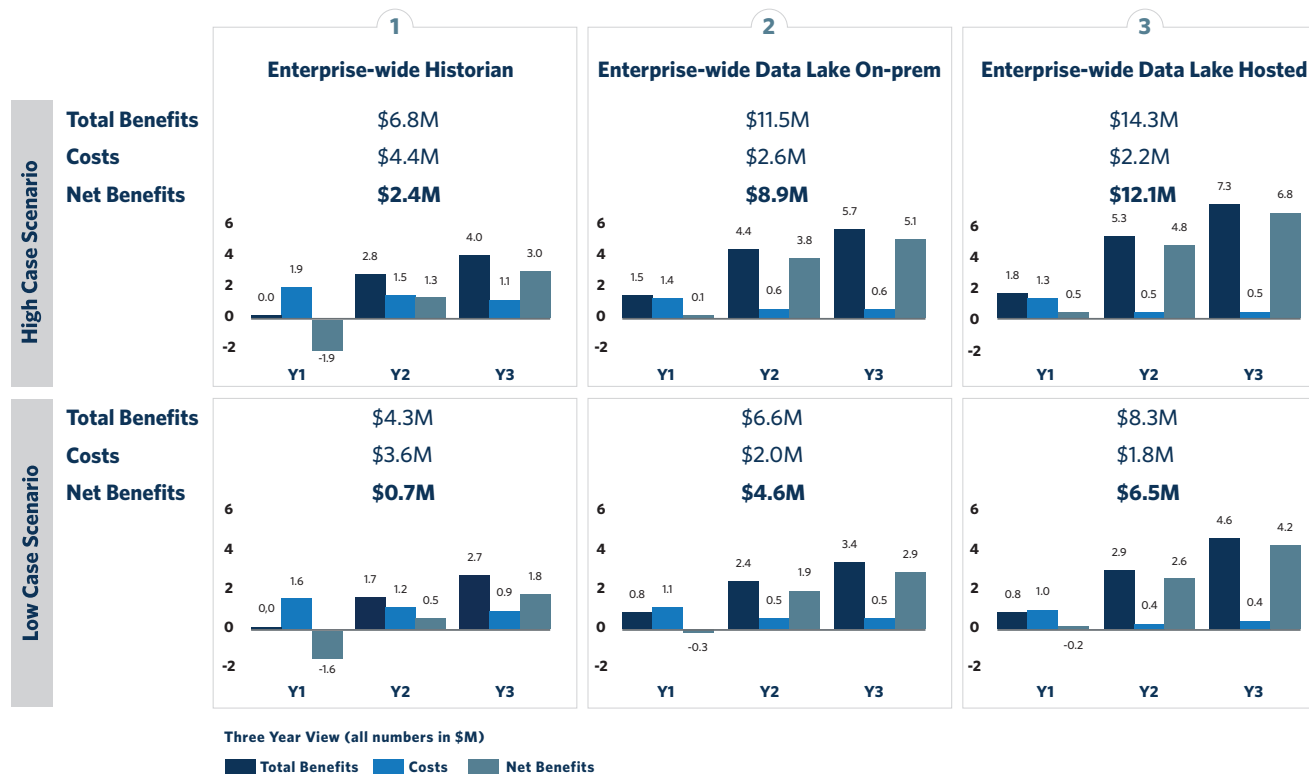


The financial summary below highlights the total 3-year net benefit

The Total Value of Ownership (TVO) analysis evaluated 3 options:

- 1. Enterprise-wide Historian:** Implementation of an enterprise-wide historian product (e.g., OSI PI)
- 2. Enterprise-wide Data Lake On-prem:** Implementation of an enterprise-wide OT product using AspenTech Inmation on-prem
- 3. Enterprise-wide Data Lake - Hosted:** Implementation of an enterprise-wide OT product using AspenTech Inmation in a cloud setting

The summary below illustrates the total costs and benefits for the High Case Scenario and Low Case Scenario. Based on the TVO comparison, the Cloud Native Data Lake Hosting option has the highest net benefit among all options.



While several benefits were considered, the primary benefit was revenue upstream through supporting new use cases

The development of the TVO model considered the following four key benefits:

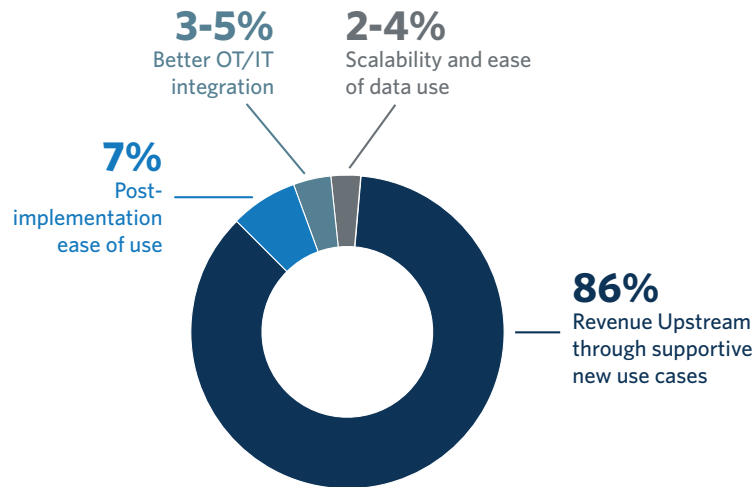
- Revenue upstream through supporting new use cases
- Post-implementation ease of use
- Better OT/IT integration
- Scalability and ease of data use

Primary drivers of costs in the TVO model are labor, infrastructure and software. However, labor costs remain the primary cost across all options.

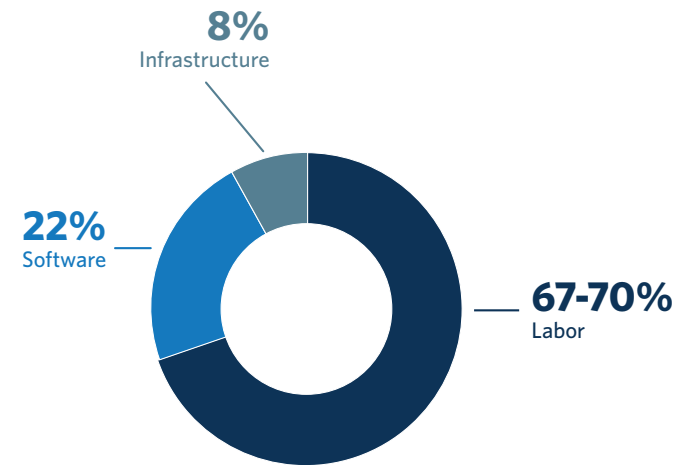
The substantial upside provided by the four key benefits provide key driving factors in recommending AspenTech Inmation.

The key benefit relates to AspenTech Inmation’s ability to capture new revenue upstream through new use cases that result in, for example, faster time to production, data monetization, predictive asset management or new product development. It is assumed that an effective implementation and full usage of a data lake solution will increase overall revenue by 1-1.25% based on the realization of new revenues.

Benefits



Costs



KEY NUMBERS

Revenue Upstream
(supporting new use cases)

>86%

of total benefit value in the
third year across all options
(both low and high range)

Post-implementation
Ease of Use

7%

of total benefit value in the
third year across all options
(both low and high range)

Better OT/IT
Integration

3-5%

of total benefit value in the
third year across options 2-3
(both low and high range)

Scalability and Ease of Data Access
of total benefit value in the third year in option 3
(low to high range)

2-4%

Labor Costs are

70%+

of all Year-1 costs are labor
costs across all options

Infrastructure costs are

6-7x

higher for on-prem options
(Options 1, 2)
compared with cloud option
(Option 3)

Software costs are

67%

higher for Enterprise-wide
Historian compared with
the AspenTech
Inmation options

The following categories of benefits were considered to drive the benefits for the TVO model

Value Creation from Supporting New Use Cases

AspenTech Information enables multiple revenue streams through:

- Enhanced predictive analytics for asset maintenance
- More Production throughput due to lower production downtimes
- Creation of new product offerings
- Monetizing data collected to product vendors
- Faster time to react to market demands and changes

Use Case Examples

It is assumed that an effective implementation and full usage of a data lake solution will increase overall revenue by 1-1.25% based on the realization of new revenue attained through the support of new use cases. Some examples of the use cases include:

- **Predictive Asset Management:** Continuous maintenance of manufacturing equipment improves production capacity efficiencies
- **Production Optimization and Operational Excellence:** Maintaining or increasing throughput and reducing downtimes
- **Data Monetization:** Collecting pump usage data to be sold back to the manufacturer of the plants for product/component safety or new product development insights
- **New Product Creation:** Ease of combining contextual data (from external data and social trends) with internal OT data for insights to create new innovative products

>86%

of total benefit value in the third year across all options (both low and high range)

1-1.25%

estimated revenue increase realized from faster time to production

Post-Implementation Ease of Use

AspenTech Inmation is easier to implement, learn, maintain and require less resources compared to an on-prem enterprise historian solution. This added benefit allows for organizations to use more cost-effective Business Analysts for the same level/amount of work that previously required higher cost Data Scientists.

Use Case Examples

Estimated enterprise FTE savings for Data and Analytics roles

Efficiently leveraging same resources for more productive utilization

More People can access instead of expensive Data Scientists

Replacing Data Scientists with cost-effective Business Analysts for the same level/amount of work

7%
of total benefit value in the third year across all options (both low and high range)

e.g., by reducing data preparation by
50%
or more

3-5 People
Can access

Better OT/IT Integration

OT data movement to the data lake requires a more enhanced OT/IT integration management between key production systems and OT/IT data movement needs. An effective OT/IT solution requires an efficient movement of data from multiple layers of production (L0 to L5) to the enterprise OT product.

Use Case Examples

- Cost savings based on efficiencies achieved through optimal use of network engineers and reduction in Integration software licenses using AspenTech Inmation.
- For example, AspenTech Inmation provides built in capabilities to better manage OT/IT integration needs thereby saving costs in integration, software and labor.

3-5%

of total benefit value in the third year across options 2-3 (both low and high range)

Scalability and Ease of Data Access

AspenTech Inmation on-prem vs. cloud has the exact same product capabilities. However, AspenTech Inmation in the cloud allows for easier scalability and access to the cloud. Cloud-based benefits compared to on prem include:

- Native platform security provided by cloud vendors
- Lowest staffing requirement among all options
- Increased scalability
- Reduce infrastructure costs
- Easier to coordinate with external vendors and partners

Use Case Examples

- Scalability and ease of data access benefits will only be realized using a cloud native data lake (Option 3)
- Increased scalability: Ability to instantly scale services through ease of coordinating with other cloud vendors and partners that are already utilizing cloud-based solutions
- In-house staffing requirements are lower for cloud-based solutions and services that offer as-a-service cloud infrastructure

2-4%

of total benefit value in the third year in option 3 (low to high range)

\$0.11M- \$0.28M

total benefit value in the third year in option 3 (low to high range)

Labor, infrastructure and software were considered as primary drivers of costs in the TVO model

Labor

The TVO model was developed using a baseline organization given a manufacturing organization with \$1B revenue and 15K employees.

Characteristics

Type of organization	Manufacturing, Utilities (e.g., water treatment facilities), Chemical Plants, etc.
Geographical focus	Business operations in USA
Size of organization	\$1B
# of employees	15,000+
Labor Cost Considerations	Implementation Training Ongoing maintenance/support

70%+
of all Year-1 costs are labor costs across all options

In year 1, labor implementation costs will be the highest cost category across all options. In years 2 and 3, the highest costs will be the labor for ongoing maintenance and support.

Infrastructure

Infrastructure costs (storage and compute) were calculated assuming an average data lake configuration of 12-14 cores for all scenarios and published cloud rates for compute and storage. Infrastructure costs for cloud are significantly lower than both on-prem options of the enterprise historian and AspenTech Inmation. Mismanagement of the data lake is a leading cause of higher cloud cost perceptions.

Infrastructure Characteristics

Storage Hardware	<ul style="list-style-type: none">Storage ServiceStorage Facilities
Compute — Server Hardware	<ul style="list-style-type: none">Compute — Server ServiceServer Facilities
Network Hardware	<ul style="list-style-type: none">Network ServiceNetwork Facilities
Cloud Specific	<ul style="list-style-type: none">Storage: Azure Data Lake Storage Gen2Compute: Virtual Machines Service

Infrastructure costs are

6-7x

higher for on-prem options (Options 1, 2) compared with cloud option (Option 3)

Enterprise-wide Historian and Enterprise-wide Data Lake infrastructure costs

Low Range

\$0.96M

High Range

\$0.13M

Cloud Native Data Lake infrastructure costs

Low Range

0.96M

High Range

\$0.13M

Software

12 licenses are considered as a conservative amount to accommodate the solution. AspenTech Inmation software costs are much lower than a typical data lake type of project giving an added advantage.

Software Characteristics

OT Software	<ul style="list-style-type: none">▪ OT Software License▪ OT Software Support
Multitenant Software	<ul style="list-style-type: none">▪ Multitenant Software License▪ Multitenant Software Support
Virtualization	<ul style="list-style-type: none">▪ Virtualization License▪ Virtualization Support

Software costs are

67%

higher for Enterprise-wide Historian compared with the AspenTech Inmation data lake options

Enterprise-wide Historian Software Costs:

Low Range

\$0.29M

High Range

\$0.34M

Enterprise-wide Data Lake and Cloud Native Data Lake software costs:

Low Range

\$0.18M

High Range

\$0.21M

Appendix

The three options provide a variety of distinct advantages and challenges, which were considered in scope for the TVO analysis

	1. Enterprise-wide Historian	2. Enterprise-wide Data Lake On-prem	3. Cloud Native Data Lake Hosting
Characteristics	<ul style="list-style-type: none"> Implementation of an enterprise-wide historian product (e.g., OSI PI) 	<ul style="list-style-type: none"> Implementation of an enterprise-wide OT product using AspenTech Inmation on- prem 	<ul style="list-style-type: none"> Implementation of an enterprise-wide OT product using AspenTech Inmation in a cloud setting
Advantages	<ul style="list-style-type: none"> Opportunity to leverage existing skills Mature analytics reporting Improved time to production On-prem data may be a requirement for data sensitive customers 	<ul style="list-style-type: none"> Post-implementation ease of use: ability to effortlessly fetch good quality data Faster time to production Enhanced OT/IT Integration Can handle higher number of data formats Higher number of prebuilt adapters to data sources (e.g., video feeds, vibration signatures and alarm/event data) Reduction of single-point solutions for cost savings Hybrid solutions would enable better management of operational costs (e.g., network download costs — egress, compute costs) 	<ul style="list-style-type: none"> Cloud-based benefits (e.g., native platform security provided by cloud vendors; lowest staffing requirement among all options; increased scalability; easier to coordinate with external vendors and partners)
Disadvantages	<ul style="list-style-type: none"> OT/IT integration is left to the client Fewer adapters to various data sources (compared with data lake) Fewer data formats handled Effort estimation to perform data integration will be less accurate due to lack of automation 	<ul style="list-style-type: none"> Immature integration into reporting tools 	<ul style="list-style-type: none"> Immature integration into reporting tools Operating costs within the cloud (e.g., no limit to potential scaling)

Revenue Upstream (supporting new use cases)

Category	Enterprise Profile
Primary Industry Classification	Manufacturing (discrete and process manufacturing)
Secondary Industry Classification (if applicable)	Utilities (e.g., water treatment facilities), Chemical Plants, etc.
Revenue	\$1B

Post-Implementation Ease of Use

Sample Key Roles

Business Analyst/BI Manager	Execution of BI management and delivery capabilities	\$131K	\$163K
Data Scientist	Formulate and lead guided, multifaceted analytic studies against large volumes of data	\$159K	\$199K

Better OT/IT Integration

Cost

Infrastructure Software	2020 market estimate of manufacturing companies' software spend on infrastructure software. Examples include IT operations management software, security software and storage management software	Forecast: Enterprise IT Spending by Vertical Industry Market, Worldwide	\$2.7M
Network Personnel	Estimated IT staffing distribution in the manufacturing industry for network personnel	IT Key Metrics Data 2020: Industry Measures – Industrial Manufacturing Analysis G00465667	\$.36M
	Estimated IT staffing cost spent on network personnel	4%	
Savings	Projected Cost savings on infrastructure software by using AspenTech Inmation	5-10%	

Scalability and Ease of Data Access

Use Case	Detail	Low	High
Address instant demand and enhance end user experience	End User experience impact/increase due to instant scalable services (% of total revenue)w	3%	5%
	Revenue impact/increase due to high end user experience (% of impact)	1%	2%
Time saved by partner interaction	Number of hours saved in a partner transaction	2	3
FTE savings in supply chain management, inventory forecasting	FTE savings in supply chain management, inventory forecasting	20%	25%

Labor

Sample Key Roles for Data Lake Team	Indicative Responsibility	Low	High
Business Analyst/BI Manager	Execution of BI management and delivery capabilities	\$131K	\$163K
Data Lake Manager	Execution of data lake management and delivery, policies, standards and enablement of capabilities (e.g., data sourcing/sharing and project management)	\$138K	\$172K
Data Scientist	Formulate and lead guided, multifaceted analytic studies against large volumes of data	\$159K	199K
Data Analyst	Provide execution to technologies, standards, processes and architectures for BI and data lake across the enterprise	\$120K	\$150K

Infrastructure

Infrastructure Category/Team	Detail	Low	High
General Infrastructure Assumptions	Number of AspenTech Inmation licenses	12	14
	vCPU to Core ratio	1	2
	RAM per Core	8	16
	Server Acquisition cost per core	\$386	\$386
	Annual Server service cost per core	\$45	\$45
	Annual Server facilities cost per core	\$28	\$28
Cloud Infrastructure Assumptions	vPCUs required for Cloud instances	12	8
	RAM required for cloud instances	96	224

Software

Software Category	Detail	Low	High
OT and AspenTech Inmation Software Assumptions	Data Lake Software License cost per core	\$20,000	
	AspenTech Inmation Software cost per core	\$1,200	
	Number of OT Software Licenses	12	14
	Software Support Rate	22%	
	Multitenant Software License cost	\$7,000	
Other Software Assumptions	Virtualization License cost	\$432	



About AspenTech

Aspen Technology, Inc. (NASDAQ: AZPN) is a global software leader helping industries at the forefront of the world's dual challenge meet the increasing demand for resources from a rapidly growing population in a profitable and sustainable manner. AspenTech solutions address complex environments where it is critical to optimize the asset design, operation and maintenance lifecycle. Through our unique combination of deep domain expertise and innovation, customers in capital-intensive industries can run their assets safer, greener, longer and faster to improve their operational excellence.

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