

SCALABLE, ACTIONABLE ANTI-MONEY LAUNDERING INFRASTRUCTURE FROM RED HAT

TECHNOLOGY OVERVIEW



Financial services institutions need to evolve their business processes to satisfy anti-money laundering regulations and reduce institutional risk.

71%

of financial services institutions expect to increase staff for AML functions next year.³

Red Hat's industrial-grade open software stack can help reduce risk through AML infrastructure—on-premise or in the cloud.

BUSINESS BENEFITS

- Ingest, analyze, and maintain large amounts of data from disparate sources with increasing accuracy
- Provide rapid access to information
- Monitor suspicious activity
- Make fast decisions
- Stay in compliance



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INTRODUCTION

The number of financial products is growing dramatically, driven by global banking efforts, a renewed focus on local markets, and increased integration between commercial and investment banking operations. At the same time, strong anti-money laundering (AML) mandates and regulations are changing the ways that banks manage their internal and external business processes.¹ Failure to adequately detect money laundering activities can introduce profound organizational risk, resulting in large fines, negative press, and severe reputational damage.

Banking IT organizations seek to satisfy new AML challenges efficiently, even as they address business needs for new functionality, better response times, and client flexibility. Technology advances such as cloud, big data analytics, and new middleware play an increasingly important role. To detect money laundering attempts, many financial firms are re-engineering their AML processes by:

- Scaling infrastructure to analyze a growing volume of transactions.
- Gleaning insights from existing long-term and real-time data sources, while integrating new types of data, such as unstructured or semistructured data feeds.
- Dynamically creating and changing business workflows, policies, and procedures to meet evolving requirements.
- Providing easy-to-use dashboards that are only accessible by authorized personnel in multiple roles, including compliance officers, auditors, and government agencies.
- Building automated business processes that meet regulatory mandates and are transparent to business process owners, auditors, and regulatory authorities.
- Writing business rules that automatically trigger downstream workflows or investigations to save time and avoid errors.
- Implementing customer due diligence (CDD), enhanced due diligence (EDD), and universal beneficial ownership (UBO) policies that enable banks to better predict types of likely transactions.
- Integrating fraud detection with anti-money laundering (FRAML).

Open source AML solutions are an especially attractive and compelling alternative, offering dramatically lower costs, rapid technology evolution, and broad community-based innovation.² Red Hat's industrial-grade open source software stack can provide many of the components of an elastic and effective AML architecture. Moreover, Red Hat® solutions let financial institutions move quickly to adopt emerging technologies, such as containers or open hybrid clouds, to address future needs.

¹ Organizations like The Money Authority of Singapore, The Financial Transactions and Reports Analysis Centre of Canada, The U.S. Department of the Treasury Financial Crimes Enforcement Network (FinCEN) Anti-Money Laundering and Counter-Terrorist Financing (AML/CTF) have recently issued multiple compliance directives in the financial sector.

² "Barclays Claims 90 Percent Software Cost Savings with Open Source Drive", www.v3.co.uk/v3-uk/news/2234593/barclays-slashes-software-spend-by-90-percent-with-open-source-drive.

³ 2017 Thomson Reuters US Anti-Money Laundering Insights Report. static.legalsolutions.thomsonreuters.com/static/pdf/2017-aml-insights-survey-report.pdf.

RED HAT SOFTWARE STACK FOR AML

- Red Hat Fuse
- Red Hat Data Grid
- Red Hat Decision Manager
- Red Hat Process Automation Manager
- Red Hat OpenShift® Container Platform
- Red Hat Storage
- Red Hat Enterprise Linux®

RED HAT OPEN SYSTEM ARCHITECTURE FOR ANTI-MONEY LAUNDERING

As financial institutions seek to build robust and automated systems for AML and fraud avoidance, they are looking for new ways to deploy technology that directly supports their business priorities. Figure 1 illustrates a general anti-money laundering solution architecture and where Red Hat products can be employed effectively.

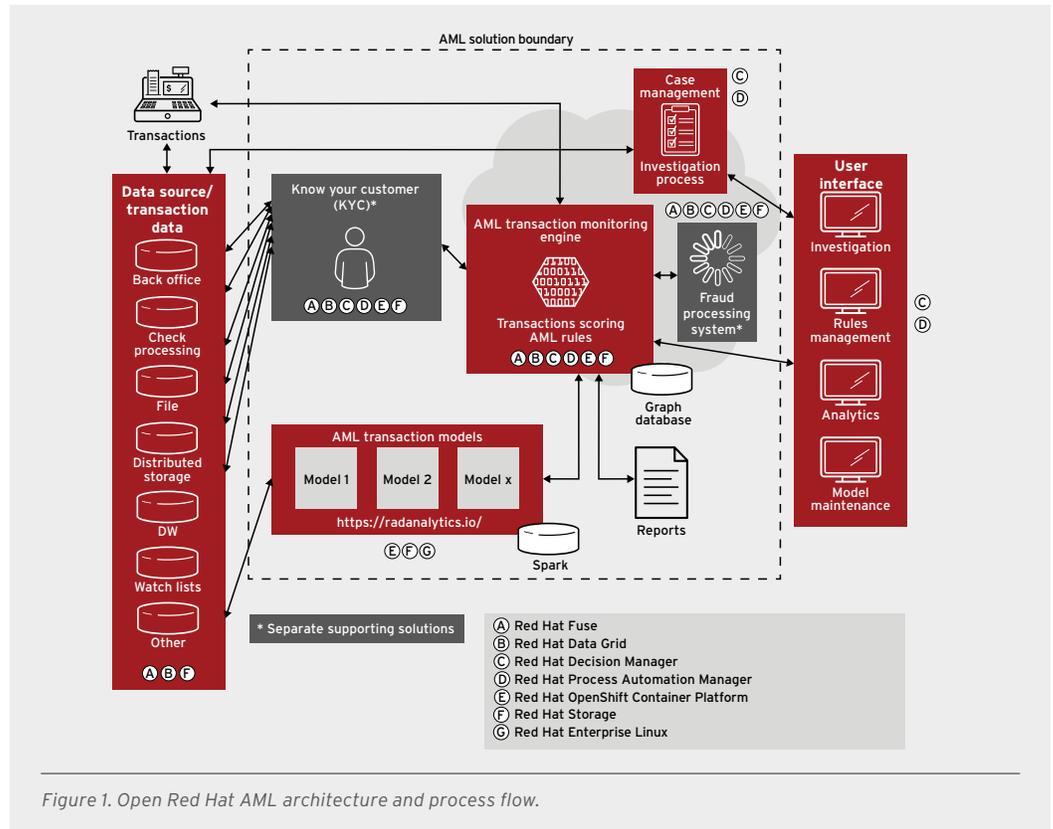


Figure 1. Open Red Hat AML architecture and process flow.

DATA SOURCES AND TRANSACTION DATA

Effective AML solutions need to support a broad range of data sources and transaction data, which can include information both at rest and in motion. Batch and real-time use cases must be accommodated, in both structured and unstructured data formats. Using Red Hat JBoss® Middleware technologies together can accommodate both batch and stream processing, giving organizations the potential ability to analyze both real-time streaming data and historical data concurrently.

- **Red Hat Fuse.** AML solutions should be able to extract and ingest data from check processing, watch lists, and databases, making data available quickly for analysis. Supporting ubiquitous connectivity with 150+ connectors and services, Red Hat Fuse can be used to support both batch processing and real-time use cases. It functions as a lightweight pattern-based integration platform for noncritical path data loads. The service provides real-time notifications, an application programming interface (API) foundation, intuitive tooling, and improved high availability to allow extensive customization in AML frameworks.

The automation technologies and cloud architecture of Red Hat OpenShift Container Platform lets organizations provision quickly, build efficiently, and get apps to market faster.

Red Hat Fuse is also the data abstraction, transformation, and provisioning engine for the AML architecture. It can ingest data directly from enterprise data storage systems. Data from storage systems or databases can also be injected directly into Red Hat Data Grid via extract, transform, load (ETL) operations utilizing the Apache Spark core library. Data in other formats can also be integrated. With Red Hat Fuse, the complexity of data types and sources is masked, allowing Red Hat Data Grid to speed application response times, reduce latency, and improve the user experience—as well as reduce load on transactional databases.

- **Red Hat Data Grid.** Once data is extracted and ingested, other services within an AML framework need fast and flexible access for processing and analysis. Red Hat Data Grid serves this purpose, functioning as an in-memory data management system that can be used as a distributed data cache and event broker. With the ability to perform both reads and writes to cache, Red Hat Data Grid can function as a key-value store similar to a NoSQL database. This ability means that it can serve as the primary application data source for rapid retrieval of in-memory AML data. It can also be used to persist transaction data for recovery and archiving. Applications can run data-intensive operations like queries, transaction management, and distributed workloads against Red Hat Data Grid.

AML TRANSACTION MONITORING ENGINE

An effective AML system needs to enable rapid and flexible application development. Business experts and application developers alike need to be able to model, automate, measure, and improve their critical policies and processes executed as a part of business rules. Red Hat Decision Manager combines the power of declarative logic with business rules to facilitate compact, fast, and easy-to-understand business applications. Analysts and developers can now work on the same artifacts, since the rules are both human readable and machine executable. Generally two kinds of rules are involved:

- Rules automatically generated by Apache Spark jobs based on historical transactions can create a profile of a customer (e.g., average daily cash deposit, average cash transfers, average credit card transactions, etc.)
- Analyst-managed decision tables are used to take necessary action based on the risk score of a particular transaction.

Identity data quality

AML systems must reliably match data elements and determine a quality score to avoid false positives. For example, names and addresses of customers—complete with typos or intentional errors—must be matched against the Office of Foreign Asset Control (OFAC) list of known terrorists.

As an in-memory data management system, Red Hat Data Grid provides configurable ACID (atomicity, consistency, isolation, durability) transaction support and integration with Apache Spark and Apache Cassandra. It also provides querying capabilities with Hibernate Search and Apache Lucerne used to index and search objects in the cache. Users can obtain objects within the cache based on some of the object's properties—without needing to know the keys to each object that they want to obtain.

Watch list support

Analysts need to be able to easily maintain and update watch lists provided by governmental organizations, sanctions lists from compliance organizations, and confidential internal watch lists. Using Red Hat Fuse, diverse watch lists can be accessed and retrieved from different governments and agencies. Watch lists can then be stored in a cache or database, or converted into a decision table, ensuring that the system is always updated with the latest lists, rules, and policies.

FRAUD PROCESSING SYSTEM

The fraud processing system is technically a separate supporting solution to anti-money laundering, but it too needs to take advantage of emerging technology frameworks such as analytics, machine learning, and artificial intelligence.

Analyst interface

Once a transaction is flagged, the system needs to provide an adaptive and responsive analyst user interface with the following functionality:

- **Rules.** With Red Hat Decision Manager, the logger functionality of the rules engine can easily create an audit trail of the rules that have been executed. This capability helps the analyst understand the transaction under investigation and what data or conditions triggered the investigation.
- **Process.** Red Hat Process Automation Manager integrates process and decision management, coupled with simple tools for both business experts and developers, making it easy for project stakeholders to collaborate and design business processes and define policies. The business process diagram can be displayed with current steps highlighted, helping analysts understand both completed and next steps.
- **Analytics.** Red Hat Fuse includes modular integration capabilities and an enterprise service bus (ESB) to unlock information. Using this mechanism, the system can retrieve all of the associated data about the transaction and related customers. This information can then be stored in Red Hat Data Grid for quick access.
- **Administrator view.** Red Hat Process Automation Manager provides a portal that offers multiple views of tasks, including the number of open tasks, tasks assigned to analysts, delegated tasks, and time taken to complete a task. These graphs can be easily embedded in custom dashboards so that management leads have complete visibility into analyst activities.

Statistically based fraud detection

Fraud detection is increasingly based on machine learning. These methods use statistics and analytics to classify potential fraud investigations. Descriptive analytics or unsupervised learning finds unusual or anomalous behavior that deviates from the average behavior. In contrast, predictive analytics seeks to build an analytical model predicting a target model of interest. Red Hat Storage can be used to provide distributed file services—either on-premise or in the cloud—to support a wide range of analytics activities.

RED HAT AML ARCHITECTURE BUSINESS BENEFITS

The open architecture is built to support emerging technologies to protect AML infrastructure investments into the future.

- **Get rapid access to information** by ingesting, analyzing, and maintaining large amounts of data from disparate sources.
- **Detect, monitor, and prevent suspicious activity** like money laundering and terrorist financing with fewer false positives by making use of CEP rules and analytics.
- **Make faster decisions** with a modular approach that allows business processes to be designed quickly and invoked dynamically with automatic reporting based on pre-defined business processes and custom dashboards automating and accelerating workflows.
- **Stay in compliance** with adaptive rules that can be generated automatically and updated as market conditions change.

Reporting

Financial institutions must comply with variety of reporting requirements, designed to identify suspect individuals and transactions.

- **Currency transaction reports (CTRs).** CTRs are used to identify individuals conducting cash transactions and maintain a trail for cash withdrawals and deposits, foreign currency exchange, and other cash transactions. Red Hat Decision Manager provides easy-to-write rules that can identify when a CTR needs to be filed. When needed, the system can also automatically file a CTR. Red Hat Decision Manager also comes with a complex event processing (CEP) engine. Using CEP sliding window patterns, the system can easily keep track of all of transactions performed in a 24-hour window, filing a CTR accordingly.
- **Suspicious activity reports (SARs).** Once a transaction is flagged, financial institutions are required to file an SAR report with FinCEN within 30 days. Red Hat Process Automation Manager can generate the SAR from the various templates stored in the system. The relevant data can be pulled from the downstream system using Red Hat Fuse or from the Red Hat Data Grid cache. This level of automation can improve analyst efficiency since reports no longer need to be created manually.

Fraud reduction anti-money laundering (FRAML)

Fraud is on the rise, with high-profile data breaches and identity theft a widespread concern. AML systems need to seamlessly integrate with other fraud management systems to help combat these trends effectively. Red Hat Decision Manager facilitates AML systems that are built using micro business process services. These services are independently managed and developed and can be invoked dynamically based on rule sets or transition conditions. The services can also be easily deployed and scaled.

Updating the AML processes—dynamically and via analyst

Modern AML infrastructure needs to represent a living system. Rules, processes, and machine learning models need to be dynamic—and easily updated. Red Hat Decision Manager and Red Hat Process Automation Manager are both open source solutions, allowing ongoing innovation from a vibrant development community. APIs are available to update and generate the rules. As rules are human readable, business analysts can update them easily as needed, deploying them without any system downtime.

AML HYBRID CLOUD

To operate in a flexible and cost-effective manner, an AML system must provide timely information that lets analysts react as quickly as possible. In Red Hat's solution architecture, the AML transaction monitoring engine works across a cluster or clusters of industry-standard servers. These nodes can be located on-premise or in a public cloud. This hybrid cloud model lets organizations gain considerable agility by deploying truly scalable AML solutions that can adapt quickly to new challenges or changing regulatory environments. Embracing technology like containers and big data analytics can yield significant benefits.

- **Containers.** Containers are a significant enabling technology for packaging and deploying AML images. Both the AML transaction monitoring engine and transaction models shown in the architecture can benefit directly from container technology. Red Hat OpenShift Container Platform includes Red Hat's enterprise-ready Kubernetes implementation for orchestration, making it ideal for deploying AML in the cloud. Red Hat Storage supports containers directly, allowing storage itself to be deployed as a container. Together with Red Hat OpenShift Container Platform, this capability allows storage to be deployed close to compute resources in a cloud setting.
- **Big data analytics.** Apache Spark can harness the resources of thousands of compute cores to run random trials and aggregate their results. It can transform raw financial data into model parameters needed to carry out simulations as well as persisting the result in a cache store via Red Hat Data Grid. Apache Spark also provides SQL support for analyzing the results. The simplicity of Apache Spark's programming model can greatly reduce development time—allowing programming in Scala, Java, or Python. Red Hat Storage allows data spread across multiple machines to be accessed as a single logical entity.
- **High-performance ingest.** A high-performance ingest mechanism such as Apache Kafka or Red Hat Fuse can be used to extract data from the data injector and insert the data into Red Hat Data Grid via an Apache Spark or Flink layer. At that point, Red Hat Decision Manager can derive real-time business rules and dynamically create new workflows based on the rules. After the data is inserted into the grid, incremental algorithms are run and resulting data is stored in the aggregated results and reporting layer for querying, analytics, and visualization applications.

CONCLUSION

Anti-money laundering infrastructure needs to be flexible and innovative to allow organizations to address current business needs even as they adapt to a changing regulatory environment. Open Red Hat technology can help financial services companies respond more quickly and efficiently, with anti-money laundering architecture that can evolve to meet new challenges. Beyond the limitations of proprietary solutions, incorporating analytics, containers, and open hybrid cloud solutions brings a new agility to AML solutions.



ABOUT RED HAT

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.



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