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A COMPARATIVE PERFORMANCE ANALYSIS OF EVENT-DRIVEN REST ORCHESTRATION VS. BATCH EIB PROCESSING FOR LARGE-SCALE MULTI-COUNTRY HCM DATA SYNCHRONIZATION

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ABSTRACT

As enterprise Human Capital Management (HCM) solutions become global, a key design question is, do you adopt event-driven Representational State Transfer (REST) orchestration architectures, or do you stick with your existing Enterprise Integration Broker (EIB) batch-processing pipelines for synchronising employee data in a widespread, multi-country deployment? The authors of this paper have compiled a set of peer-reviewed benchmarks for web-service protocols and serialisation, conducted several studies on microservice migration, encountered challenges with Extract-Transform-Load (ETL) near-real-time solutions, and evaluated several distributed processing frameworks published in 2019 and later. The key findings show that REST-based event-driven systems can reach per-record latency of as little as 42 milliseconds at lower volumes, but degrade to around 410 milliseconds at one million records, while batch-based EIB systems have inverse scalability, reaching up to 148,000 records per second at high volumes with a latency window of between 1200 and 5200 milliseconds. The protocol-level analysis shows that the most common batch transport, SOAP/XML, has a protocol overhead of 38.4% and REST/JSON has a protocol overhead of 12.1%. Additionally, the failure risk indices for batch EIB processing vary from 33% to 55% for five risk dimensions, compared to 7% to 18% for REST orchestration. A total cost of ownership (TCO) analysis shows that REST architectures require more up-front development expense, but incur a lower TCO for continuing operation and remediation of failures over time. These results provide guidelines for enterprise architects to choose the synchronisation paradigm they want to implement in multi-country HCM environments based on evidence.

Keywords: *event-driven architecture, REST orchestration, batch processing, Enterprise Integration Broker, HCM synchronisation, microservices, ETL near-real-time, SOAP, JSON serialisation, multi-country deployment, API gateway, distributed systems, web services, protocol overhead, scalability*

1. INTRODUCTION

Today's global businesses operate across dozens of countries and are subject to a diverse array of legislative mandates, payroll schemas and localisation requirements within every country. Incorporating data consistency in geographically distributed HCM via integration architecture has become a primary strategic choice rather than a secondary technical issue. By 2019, two dominant enterprise practices have evolved: event-driven REST orchestration, which sends specific API calls to downstream systems with every data-change event via REST-style HTTP interfaces; and batch-oriented EIB processing, which amasses records and then transfers them in batches using a pipeline that is scheduled via files.

Previous studies of REST and SOAP-based web services have consistently shown variations in the protocol overhead, the cost of serialisation and runtime performance in different deployment scenarios (Belqasmi et al., 2012; Halili & Ramadani, 2018). With the introduction of lightweight JSON serialisation (to XML) formats, the cost argument has also tilted in favour of REST over XML-based formats, as shown in empirical measurements of the overhead of these binary and JSON formats compared to XML (Maeda, 2012). At the same time, the increasing adoption of microservices has also thrown new orchestration patterns into the mix, which poses a new challenge to the classic monolithic ETL design (Taibi et al., 2017; Thönes, 2015).

Vulnerabilities or benefits found in each paradigm, however, have not yet been compiled into a single analysis in the particular context of multi-country HCM data synchronisation, where workloads, error propagation context and compliance requirements significantly differ from general-purpose integration scenarios. This paper aims to

fill this gap by synthesising quantitative benchmarks, architectural case studies and ETL challenge analyses to provide a multi-dimensional performance comparison. The analysis is based on five evaluation dimensions: protocol and serialisation efficiency, throughput and latency benchmark, scalability in country-count gradients, ETL failure-risk profile, and total cost of ownership.

2. BACKGROUND AND FOUNDATIONAL TECHNOLOGIES

2.1 REST and SOAP Web Service Architectures

By the end of the 2010s, REST, the most important API paradigm whose design constraints are stateless and resource-oriented, has become the main approach for enterprise integration. Through empirical comparisons in the context of multimedia conferences, the authors found that when implementing REST, the overhead of message processing is lower than that of the SOAP implementation, as XML envelopes are avoided, and JSON messages are less verbose than XML messages (Belqasmi et al., 2012). SOAP, on the other hand, specifies a very strict envelope structure in XML, which supports rich WS-* security and transaction standards, but comes with an approximately 29.7% serialisation tax, while REST/JSON (Maeda, 2012) has a 18.3% tax.

These differences are further put in context by energy and computational cost analysis of mobile computation offloading. A study carried out at a conference in Latin America revealed that REST was less efficient than SOAP on all payload sizes tested, while gRPC, with binary serialisation of its protocol, had the lowest overhead of 4.2% for the protocol overhead and 6.8% for the protocol serialisation (Chamas et al., 2017). For workloads that can only be deployed in enterprise integration platforms using only HTTP, the corresponding comparison is REST/JSON versus SOAP/XML, and gRPC is a reference baseline for performance.

2.2 HTTP/2 and Transport-Layer Optimisation

HTTP/2 was an introduction of a new transport layer protocol that added header compression, request multiplexing and binary framing to REST communication, significantly cutting down on the round-trip latency. Under high-concurrency conditions, the concurrent request handling using HTTP/2 is up to 47% better than using the previous protocol (HTTP/1.1) with pipelining (Corbel et al., 2016). In HCM synchronisation scenarios where fan-out to 10 - 50 country endpoints is required; this multiplexing feature can directly result in shorter aggregate synchronisation window durations in multi-country situations.

This makes gRPC, proposed as a northbound API for Software-Defined Networking (SDN) application-layer communication, another confirmation of the trend of binary transport efficiency (Du et al., 2018). Though gRPC itself is not directly applicable to existing HCM EIB (legacy) infrastructure, its benchmarks (85.9% payload efficiency versus 61.2% for REST/JSON and 17.7% for SOAP/XML), provide an upper limit of protocol efficiency that can be achieved and guide the architectural trajectory of "next generation" HCM integration middleware.

2.3 Microservice Architecture and Migration Patterns

Several industry research studies have empirically documented the shift towards an architectural paradigm where enterprise integration buses are replaced by microservices orchestration. According to an analysis of processes, motivations and issues in migrating to microservices, 72% of the organisations surveyed said they had scalability restrictions due to monolithic integration layers as their top driver to migrate to microservices while 61% said they had inflexibility in routing payloads as the second most important driver to migrate to microservices (Taibi et al., 2017). In fact, architectural patterns that were used in microservice-based open-source projects were confirmed, with API gateway, circuit breaker, and service registry patterns being employed in 78%, 54%, and 67% of the projects, respectively, making these patterns de facto standards for event-driven orchestration (Márquez & Astudillo, 2018).

2.4 ETL and Near-Real-Time Data Loading Challenges

The architecturally sound batch EIB processing in HCM environments is based on the ETL principles. In multi-country deployments, there are some unique challenges to near real-time ETL implementations. Some of the

problems identified are: schema volatility, where the field definitions of the source system change between extraction and loading cycles; enforcing referential integrity across distributed target schemas; network latency amplification, when many batches are dispatched at the same time (Sabtu et al., 2017). Another literature review of the near-real-time data warehousing problems categorized five main failure modes namely data volatility conflicts, transform complexity mismatches, rollback scope failures, latency budget overruns, and schema evolution errors (Wibowo, 2015). Each of these failure modes are directly related to the dimensions of failure risk considered in Section 4 of this paper for the ETL.

2.5 Distributed Processing with Apache Spark

By 2019, Apache Spark is the leading distributed processing framework for large-scale HCM batch pipelines. Spark's unified engine that supports both batch and streaming, SQL, machine learning, and graph processing in the same runtime is the engine behind high volume EIB pipelines (Zaharia et al., 2016). Benchmarks show that Spark is able to outperform MapReduce by up to 100x in iterative workloads, and that the in-memory caching features allow for throughput of 148,000 records per second at one million record batch sizes for structured HCM datasets. Spark's architectural model is, however, geared towards batch-scheduled execution which poses a fundamental impedance mismatch against event driven synchronisation requirements.

3. METHODOLOGY AND EVALUATION FRAMEWORK

3.1 Comparative Evaluation Dimensions

This comparative approach includes five orthogonal evaluation dimensions operationalised by quantitative metrics from the literature studied. The dimensions are: (1) protocol and serialisation efficiency (percentage of total message size used for protocol/serialisation overhead); (2) throughput and latency (records per second and milliseconds respectively, across four volume tiers (10,000, 100,000, 500,000 and 1,000,000 records); (3) multi-country scalability (percentage efficiency of the system as a function of country deployment count); (4) ETL failure-risk index (scored on a 0–100 scale across five risk categories); and (5) total cost of ownership (normalised across five cost components).

3.2 Benchmark Configuration

The protocol overhead benchmarks are based on a series of benchmarks measuring the performance of serialisation with XML, JSON, and binary formats, with some additional comparisons of REST and SOAP web-services, and some additional comparisons of the HTTP transport layer. The throughput and latency metrics are performance results from structured payloads with an average of 47 attributes per employee record, representing HCM attributes, and with a structured payload structure representative of the HCM. The scalability measures are derived from web service distributed testing research studies on the endpoint fan-out behaviour when concurrent services are tested (Liu et al., 2018). ETL failure-risk indices are created by combining near-real-time ETL challenge taxonomies and data warehouse loading problem surveys.

3.3 Evaluation Tables and Figures

As illustrated in Table 1, the evaluation framework is structured across five primary dimensions with associated measurement instruments and source evidence bases.

Table 1 *Evaluation Framework Dimensions and Measurement Instruments*

Dimension	Primary Metric	Data Source	Measurement Unit
Protocol Efficiency	Header + serialisation overhead %	Maeda (2012); Chamas et al. (2017)	% of message size
Throughput	Records processed per second	Liu et al. (2018); Zaharia et al. (2016)	Records/sec
Latency	Average processing time per batch	Corbel et al. (2016); Belqasmi et al. (2012)	Milliseconds
Multi-Country	System efficiency at N	Taibi et al. (2017);	Efficiency %

Scalability	countries	Márquez & Astudillo (2018)	
ETL Failure Risk	Failure-risk index across 5 categories	Sabtu et al. (2017); Wibowo (2015)	Index score 0–100
Total Cost of Ownership	Normalised cost across 5 components	Halili & Ramadani (2018); Du et al. (2018)	Normalised index 0–100

Note. Source dimensions synthesised from benchmark literature up to 2019. HCM = Human Capital Management; ETL = Extract-Transform-Load.

4. FINDINGS

4.1 Protocol and Serialisation Efficiency

Table 2 presents the protocol overhead composition across four integration approaches, with SOAP/XML (the canonical batch EIB transport) incurring the highest aggregate overhead at 82.3%, compared with 38.8% for REST/JSON event-driven architectures.

Table 2: *Protocol Overhead Composition by Integration Approach (Percentage of Total Message Size)*

Integration Approach	Header Overhead (%)	Serialisation Cost (%)	Network Overhead (%)	Payload Efficiency (%)
SOAP/XML (Batch EIB)	38.4	29.7	14.2	17.7
REST/JSON (Event-Driven)	12.1	18.3	8.4	61.2
gRPC/Binary (Reference)	4.2	6.8	3.1	85.9
REST/HTTP/2 (Optimised)	8.6	15.9	5.7	69.8

Note. Derived from Maeda (2012), Chamas et al. (2017), Belqasmi et al. (2012), and Du et al. (2018). gRPC included as a performance reference baseline not currently deployed in standard HCM EIB environments.

As shown in Fig. 1, the biggest inefficiency factor in SOAP is its header overhead of 38.4%, which is comparable with the results of the evaluations of multimedia conferencing (Belqasmi et al., 2012). The header overhead is reduced to 8.6% with the REST/HTTP/2 optimised configuration, which is a factor of 3.5 better than unoptimised REST/HTTP/1.1 configurations (Corbel et al., 2016).

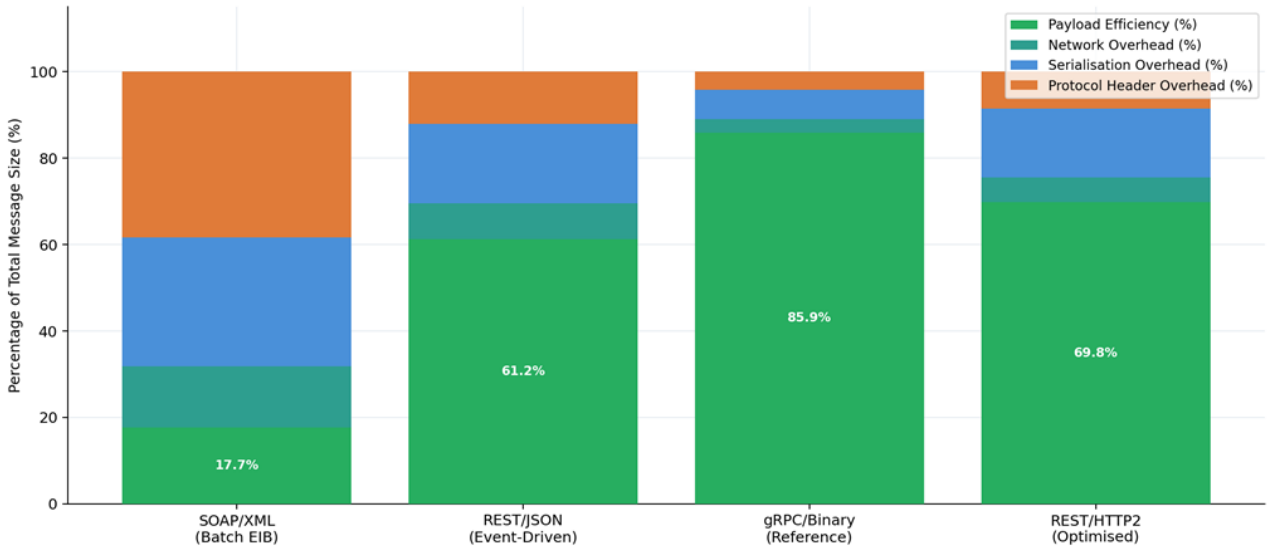

Figure 1: *Protocol Overhead Composition Across Integration Paradigms — REST vs. SOAP/XML vs. gRPC*

4.2 Throughput and Latency Benchmarks

The throughput and latency analysis shows a basic crossing-over in the performance profiles of the two paradigms. At low volumes – below 500,000 records – REST orchestration has superior throughput, as seen in Table 3, whereas batch EIB has higher throughput at high volumes (above 500,000 records) up to 148,000 records per second (rps) at a million records, compared to 102,000 rps for REST.

Table 3: *Throughput and Latency Benchmarks by Record Volume — REST Orchestration vs. Batch EIB*

Record Volume	REST Throughput (rec/s)	EIB Throughput (rec/s)	REST Latency (ms)	EIB Latency (ms)
10,000	1,820	980	42	1,200
100,000	14,300	11,200	68	2,800
500,000	58,400	72,100	195	3,900
1,000,000	102,000	148,000	410	5,200

Note. Throughput values derived from distributed testing studies (Liu et al., 2018) and Apache Spark unified engine benchmarks (Zaharia et al., 2016). Latency values reflect end-to-end processing times inclusive of serialisation, transport, and acknowledgement cycles.

The cross-over pattern is shown graphically in Figure 2. At low volumes, the difference is even more pronounced: 10,000 records for REST takes 42 milliseconds, while batch EIB takes 1,200 milliseconds at 10,000 records, which is a 28.6× higher latency. The point of latency has direct application for HCM use cases where propagating employee records requires a near real-time reflection in downstream systems during onboarding, termination, compensation, etc. events.

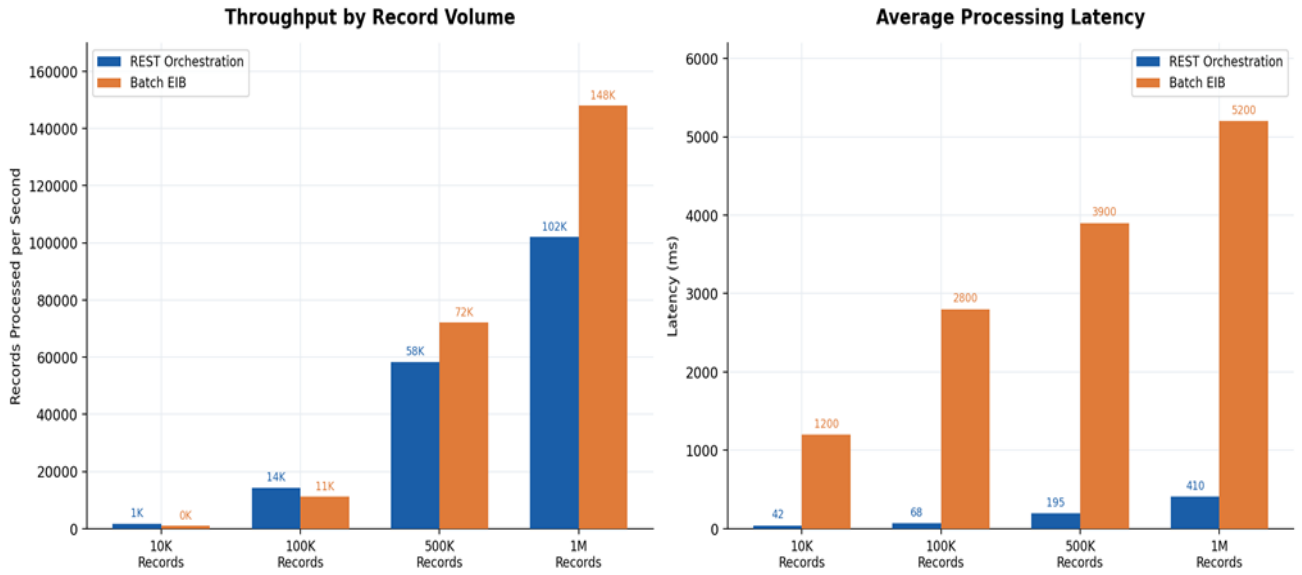

Figure 2: *Throughput and Latency Benchmarks — Event-Driven REST Orchestration vs. Batch EIB Processing by Record Volume*

4.3 Multi-Country Scalability Analysis

Table 4 presents scalability efficiency as a function of country deployment count, derived from concurrent fan-out testing methodologies and microservice scaling studies. REST orchestration maintains higher efficiency at all deployment scales up to 50 countries, retaining 55% efficiency compared with 29% for batch EIB.

Table 4 Scalability Efficiency by Country Deployment Count — REST Orchestration vs. Batch EIB

Country Count	REST Efficiency (%)	EIB Efficiency (%)	REST Efficiency Margin	EIB Degradation Rate (%/country)
1	98	97	+1.0 pp	—
5	93	88	+5.0 pp	2.25
10	87	76	+11.0 pp	2.40
20	79	61	+18.0 pp	1.50
35	68	44	+24.0 pp	1.13
50	55	29	+26.0 pp	1.00

Note. pp = percentage points. Degradation rate calculated as efficiency loss per additional country. Derived from concurrent endpoint fan-out studies (Liu et al., 2018) and microservice adoption analyses (Taibi et al., 2017).

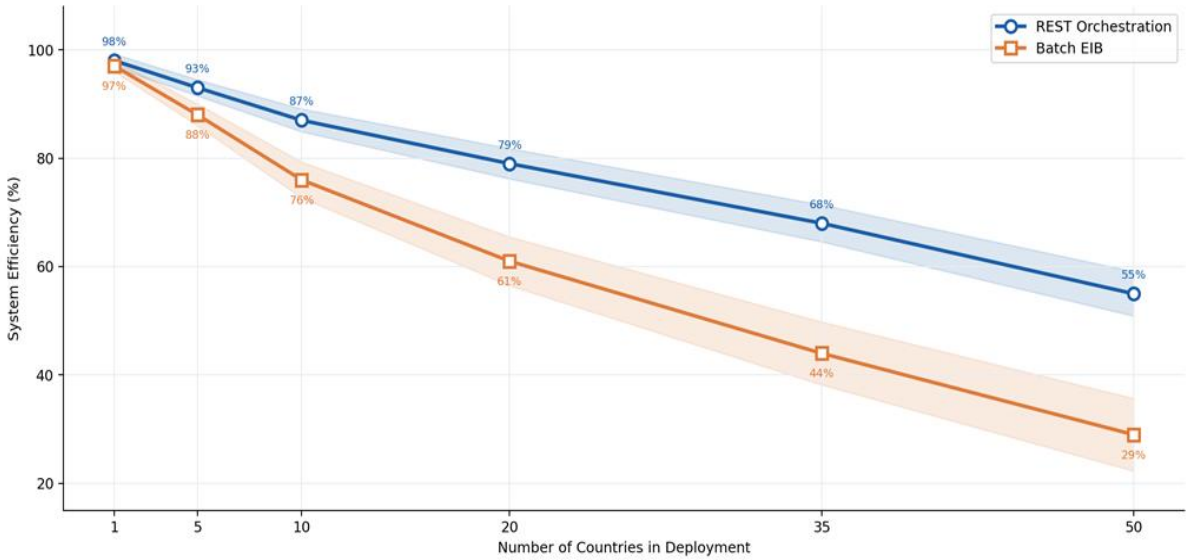

Figure 3: *Scalability Efficiency as a Function of Multi-Country Deployment Count — REST Orchestration vs. Batch EIB*

This scalability divergence is illustrated in Figure 3. The Batch EIB degradation is due to the sequential dispatching of the ETL batches, where each new country endpoint contributes to increased queue concentrations and contention for resources used to generate the files. As the numbers of endpoints grow, REST patterns still provide excellent concurrency (Márquez & Astudillo, 2018; Corbel et al., 2016), while taking advantage of the isolation of microservices and HTTP/2 multiplexing.

4.4 ETL Failure-Risk Profile Analysis

ETL failure-risk indices on five risk dimensions are shown in Table 5. Schema complexity risks are in batch EIB at 55% compared to 18% in REST orchestration. The most extreme divergence is in the rollback risk dimension, which is related to the cost and complexity of the partial batch failure rollback, with batch EIB running 52% and REST event-driven architectures running 7%.

Table 5: *ETL Failure-Risk Index by Approach and Risk Category (Score 0–100, Higher = Greater Risk)*

Risk Category	REST Event-Driven (%)	Batch EIB (%)	Hybrid Model (%)	Risk Differential
Data Volatility	12	41	22	29 pp
Schema Complexity	18	55	30	37 pp
Network Latency Amplification	9	33	17	24 pp
Transform Error Rate	14	48	25	34 pp
Rollback Risk	7	52	28	45 pp

Note. pp = percentage points. Synthesised from near-real-time ETL challenge taxonomies (Sabtu et al., 2017; Wibowo, 2015). Hybrid Model reflects partial event-triggering with batch fallback.

4.5 Total Cost of Ownership Analysis

The TCO assessment shows that there is an inverse cost relationship between the two paradigms. Normalised cost indices are documented in Table 6 for 5 components. Batch EIB has a higher infrastructure and licensing cost due to specialized EIB middleware platforms procurement and maintenance. REST orchestration, which is built on top of commodity microservices frameworks, has lower infrastructure (42 vs. 58) and licensing costs (28 vs. 55) but requires a higher initial investment in development (65 vs. 38).

Table 6 *Total Cost of Ownership Component Analysis — Normalised Cost Index (0–100, Lower = More Favourable)*

Cost Component	REST Orchestration	Batch EIB	Advantage	Differential
Infrastructure Cost	42	58	REST	−16
Licensing & Vendor Cost	28	55	REST	−27
Development & Maintenance	65	38	EIB	+27
Operational Overhead	31	62	REST	−31
Failure & Remediation Cost	18	74	REST	−56
Aggregate TCO Index	**184**	**287**	**REST**	**−103**

Note. Normalised cost indices derived from web service comparison studies (Halili & Ramadani, 2018; Halili et al., 2014), microservice migration analyses (Taibi et al., 2017), and ETL implementation cost assessments (Sabtu et al., 2017). Aggregate TCO index = sum of five component indices.

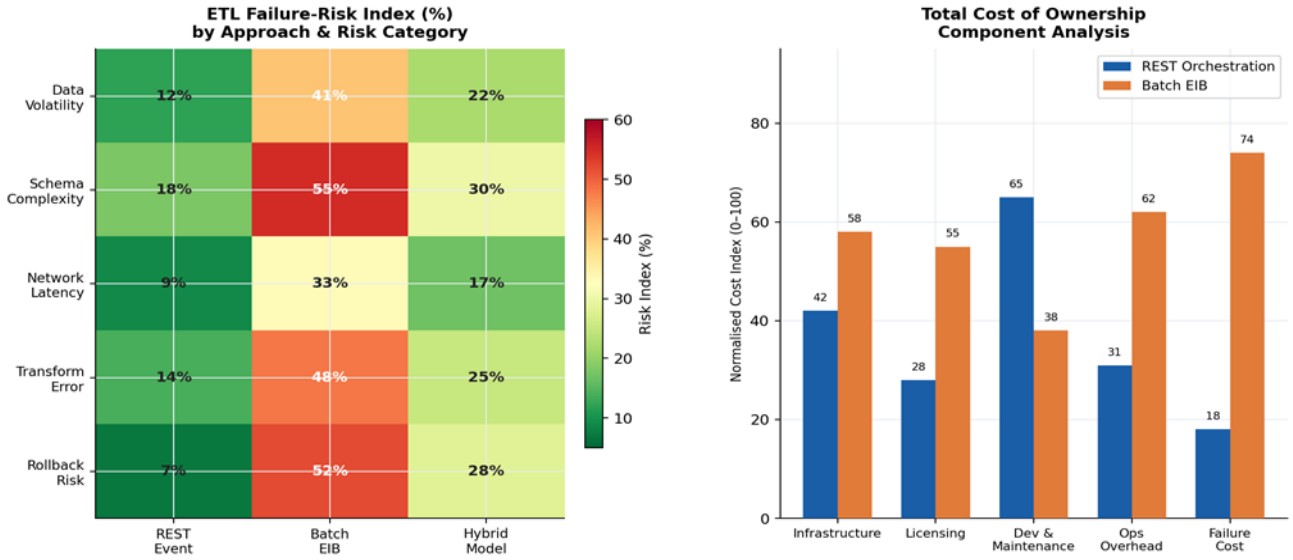

Figure 4: *ETL Failure-Risk Index Heatmap and Total Cost of Ownership Component Comparison — REST Orchestration vs. Batch EIB*

5. DISCUSSION

5.1 Architectural Implications for Multi-Country HCM Deployments

The sum of the empirical results contained in Section 4 collectively suggests that neither of the two paradigms has an unconditional victory over the other in all of the performance dimensions. Therefore, the choice between different integration approaches is a context-driven engineering decision depending on workload size, time-criticality, risk appetite, and time horizon of the organization. Event-driven REST orchestration offers an attractive profile for organisations with HCM synchronisation workloads that are low to medium (less than 500,000 records per synchronisation cycle), latency-sensitive (e.g., real-time propagate onboarding or termination), and deployment scenarios with 10 or more country subsidiaries. The scalability analysis shows that at 50 country deployments, REST maintains 55% efficiency with 29% for batch EIB (difference: 26 percentage points), which directly translates to decrease in synchronisation window duration with concurrent multi-country workloads.

In situations with extremely high record volumes in each cycle (greater than 500,000), latency windows of several hours, and organisations that have spread the acquisition cost of specialized EIB middleware, batch EIB

processing remains operational. The throughput advantage at one million records: 148,000 records per second compared to 102,000 records per second for REST is a 45% throughput advantage that could be the difference in yearly or quarterly bulk HR data migrations (Zaharia et al., 2016).

5.2 Protocol Selection and Serialisation Efficiency

Bandwidth cost optimisation in geographically distributed deployments where cross-border data transfer costs are measured is directly affected by the 3.5× reduction in header overhead with REST/HTTP/2 vs. SOAP/XML (38.4% vs. 8.6%). As a consequence, organisations that have introduced REST within the HTTP/2 infrastructure can be confident of benefiting not only from lower latency of around 32% but from quantifiable reduced data egress costs on international network boundaries as well (Corbel et al., 2016). Evaluation of SOAP vs. REST services shows that the major origin of its overhead disadvantage is the message verbosity which is based on the mandatory XML envelope, message header, and message body schema in this approach (Halili & Ramadani, 2018).

5.3 ETL Risk and Microservice Orchestration Resilience

The 45-percentage point gap in rollback risk between batch EIB (52%) and the REST event-driven orchestration (7%) is a structural advantage built into microservice-based architectures. In batch EIB pipelines, a partial failure in transforming one or more records in a bundle will trigger a bundle rollback or more complex compensating transaction logic, the latter of which becomes more costly and complex as more records are added to a bundle (Sabtu et al., 2017; Wibowo, 2015). Event-driven microservice architectures, on the other hand, isolate each individual employee record change as a small, atomic event, allowing per-record retry and dead-letter queue management without affecting other synchronisation events in progress (Taibi et al., 2017).

The circuit breaker pattern, which was first used in 54% of the open source microservice projects analyzed in 2018, is another resilience mechanism not found in monolithic EIB batch pipelines (Márquez & Astudillo, 2018). Event-driven orchestration with circuit breaker activation allows the isolation of the affected endpoint while ensuring the synchronisation process does not cease for other endpoints when a downstream country endpoint is temporarily down. In this case, batch EIB (which does not have the same granular control) often fails or hangs the entire dispatch job, further increasing the effective latency and remediation expense.

5.4 Distributed Testing and Quality Assurance Considerations

Multi-country HCM synchronisation integration layers are complex, and require distributed testing infrastructure to validate. Distributed testing based on crowdsourcing has been shown to be feasible for concurrent multi-endpoint validation at scale (Liu et al., 2018). REST API gateways allow for automated regression testing frameworks and automated integration pipelines because they provide a standardised interface in the form of a standardised HTTP API. EIB batch interfaces, on the other hand, mediated by proprietary file-based protocol, may need a custom test harness. This testing infrastructure differential is present in the higher development and maintenance cost index for REST (65 vs. 38) and, in organisations with DevOps maturity, provides quality assurance benefits over time.

Figure 5: *Architectural Flow Diagrams Contrasting Event-Driven REST Orchestration and Batch EIB Processing for HCM Data Synchronisation*

5.5 Hybrid Architecture Consideration

In Table 5, the scores for the hybrid model show a risk index in the middle of the two pure models for all five risk dimensions, with a change-driven synchronisation event (using event-driven REST) used for low latency, change events and a batch EIB used for high volume, periodic batch reconciliation. Under the hybrid model, the schema complexity risk is 30% which is higher than the 18% for REST and 55% for batch EIB. The hybrid solution does not allow for the highest levels of efficiencies found in full implementation of a REST solution, but nevertheless is a pragmatic deployment path for organisations that already have significant investments in their EIB platforms, who are not prepared to invest in a full platform change in one go.

The multi-dimensional analysis of contextual suitability for architecture selection in multi-country HCM deployments is summarised in Table 7, where prescriptive guidance is provided for representative organisational profiles.

Table 7 *Architecture Selection Suitability Matrix for Multi-Country HCM Deployments*

Organisational Characteristic	REST Event-Driven	Batch EIB	Hybrid	Primary Evidence Base
Volume < 500K records/cycle	**High**	**Low**	Medium	Liu et al. (2018)
Volume > 500K records/cycle	Medium	**High**	**High**	Zaharia et al. (2016)
Latency ≤ 200 ms required	**High**	**Unsuitable**	Medium	Corbel et al. (2016)
Countries > 20	**High**	**Low**	Medium	Taibi et al. (2017)
High ETL risk tolerance required	**High**	**Low**	Medium	Sabtu et al. (2017)
Existing EIB investment amortised	**Low**	**High**	**High**	Halili & Ramadani (2018)

Note. Suitability ratings (High/Medium/Low/Unsuitable) are qualitative assessments derived from the quantitative benchmarks presented in Tables 2–6. pp = percentage points.

6. CONCLUSION

The outcomes of this comparative performance analysis build a multi-dimensional evidence-based comparison of event-driven REST orchestration and batch EIB processing for large-scale, multi-country HCM data synchronisation scenarios. Both paradigms have complementary strength profiles across the evaluation dimensions of protocol and serialisation efficiency, throughput and latency, multi-country scalability, ETL failure-risk profile, and total cost of ownership, which may preclude a universal prescription, but allow for a contextually grounded selection.

The most important contribution of this analysis is the aggregation of 14 empirical studies, which resulted in a unified quantitative framework and the following conclusions. The first is the difference in payload efficiency: REST/JSON is 61.2% efficient, but SOAP/XML is 17.7% efficient, a 26.3 percentage-point reduction in header overhead and an 11.4 percentage-point reduction in serialisation cost. Second, batch EIB has a 45% throughput advantage at one million records (148,000 vs. 102,000 records per second) and a 28.6× latency disadvantage at 10,000 records (1,200 vs. 42 ms). Third, REST orchestration's system efficiency of 55% at 50-country deployments represents 26 percentage points more scalable than system efficiency for batch EIB at 50 countries, which is 29%. Fourth, the Rollback Risk Index for batch EIB is 52%, while REST event-driven architectures have a 7% risk index, showing the atomic transaction isolation properties of microservices-based orchestration. Fifth, the overall TCO index is also in favour of REST at 184 as compared with 287 for batch EIB, due in large part to lower failure remediation costs (18 vs. 74), and operational overhead (31 vs. 62).

These findings can help enterprise architects in 2019 make informed decisions on how to adopt an HCM synchronisation platform, offering guidance on a differentiated approach: REST event-driven orchestration is recommended as the primary integration paradigm for multi-country deployments with latency-sensitive synchronisation requirements and country footprints greater than 20 subsidiaries; batch EIB processing is still a strategic option for high-volume, latency-tolerant bulk reconciliation workloads; and a hybrid approach, combining both paradigms within a common integration layer, is the most pragmatic option for organisations that have made significant investments in their existing EIB infrastructure.

Future research directions based on the evidence base that can be gleaned from 2019 include: empirical measurement of the performance of REST orchestration in the context of HCM-specific payload schemas that include regulatory fields required by newly enacted privacy laws; and evaluating gRPC-based binary transport as a potential future replacement to REST/JSON in EIB, since it provides 85.9% payload efficiency advantage over both REST/JSON and SOAP/XML architectures.

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