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Access Policy Consolidation For Event Processing Systems

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Abstract:

Event processing is an approach that can capture and process the data about the events. Complex event processing is the merging the information from multiple origins. Event processing systems has a procedure that continuous event streams will be further applied operation of event streams. In distributed-applications like a large warehouse (where items can be shipped) when we are processing the events. This will be transmitting in between many security authorities. Using the access-policy every incoming event can be secured. We can increase the processing of events by calculating the measure of obfuscation values for events. Calculate the threshold for obfuscation as one of the part of access-policy and avoid the access-requirements and events will be delivered more reliable. In this way we can deliver the more events.. We also perform some experiments to assess engines scalability with respect to number of queries and propose ways for evaluating their ability in adapting to changes in load conditions. Lastly, we show that similar queries have widely different performances on the same or different engines and that no engine dominates the other two in all scenarios.

Keywords:

event, access-policy, security, obfuscation.

Introduction:

Complex Event Processing (CEP)1 has emerged as a new paradigm to monitor and react to continuously arriving events in (soft-)real time. The wide applicability of event processing has drawn increased attention both from academia and industry, giving rise to many research projects and commercial products.

Indeed, this merit has been recognized already for active database systems which promote rule-base Most scenarios where event engines are being deployed are mission-critical situations with demanding performance requirements (e.g., high throughput and/or low latency).Interestingly, the range of scenarios is very broad and presents very different operational requirements in terms of throughput, response time, type of events, patterns, number of sources, number of sinks, scalability, and more. It is unclear what type of requirements demand more from engines, what happens when parameters are varied, or if performance degrades gracefully. To address the lack of event processing performance information, in this paper we make the following contributions.i.We present a number of micro-benchmarks to stress fundamental operations such as selection, projection, aggregation, join, pattern detection, and windowing.ii.We perform an extensive experimental evaluation of three different CEP products (two commercial, one open-source), with varying combinations of window type, size, and expiration mode, join and predicate selectivity, tuple width, incoming throughput, reaction to bursts and query sharing There exists a plethora of approaches for implementing event processing networks and dealing with its intrinsic challenges.A general problem in this context, though, is to analyze the overall behavior of an EPN. Yet, there is currently no generally accepted formal model for complex event processing. The potential of utilizingcolored Petri nets to this end stems from their capability of specifying concurrency in an explicit manner with support for typing of events.processing in a non-distributed environment. In this paper, we investigate the application of colored Petri nets for specifying and analyzing EPNs. Our contribution is the mapping of concepts from EPNs to colored Petri nets with a discussion of design choices. Further, we report on the validation of the colored Petri net obtained for the FFDA with its implementation in ETALIS, an

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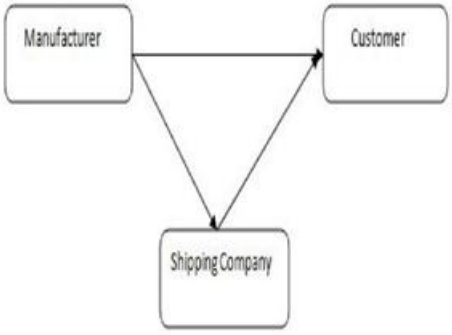


Figure 1. Access Control and Event Dependency

Open sourceevent processing engine. Finally, we demonstrate the merits of analysis and simulation capabilities for this domain, thereby contributing to the formal foundations of EPNs and opening this emerging field for Petri net analysis.

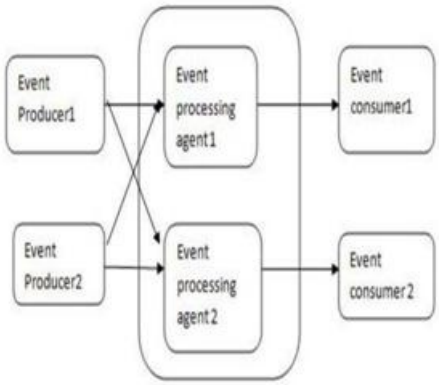
Event Processing Networks:

Event types and events: An event is a happening of interest, an `occurrence within a particular system or domain. Events are typed and an event type is a specification for a set of events with related semantics and structure.A common model for events is attribute-based, i.e., each event has a set of (required or optional) attributes organized as key-value pairs. For instance, an event of type delivery request' may be characterized by a number of attributes and values, such as `pickup = 24.09.12' and `time = 3 days'.Event producers and consumers: AnEPN consists of event producers and event consumers. Event producers emit events, eventually event consumers react upon the occurrence of events. Event processing agents act as both event producers and consumers.

Event channels: Event channels link the components of an EPN and forward events without applying any changes to them. They may incorporate routing mechanisms that limit the set of potential input events for event consumers.Event processing agents: Components that work on streams of events are called event processing agents(EPA). We distinguish EPAs that (1) filter events,(2) Transform events, and (3) detect event patterns. A Filter EPA performs a selection of events, typically based on the event attributes.A transformation EPA takes events as input, processes them, and produces a set of derived events as output using a stateful or stateless data transformation operation. A pattern detection EPA defines complexdetection logic and outputs derived events.

Event contexts: Event processing agents work on events that are considered to be relevant. This relevance is determined by the event context, which is defined along different dimensions.Most prominently, the temporal dimension partitions events based on their occurrence time, e.g., using a sliding window.Then, event detection concerns only events that occurred within the same window. Events may also be partitioned based on space, external state, or segments of attribute values.For the aforementioned example, one may require joint processing of events of type `delivery request' and `de-livery bid'. Still, only relevant events of both types shall be considered, e.g., events that occur within a window of two hours and match in their attribute values (e.g., the bid refers to a request).

Shipping companies are hosted in different domains where events will exchange include the confidential in-formation i.e. destination name, product name.In this exchange of event information third party was received the information about the event but it is confidential and given to the access rights to only the shipping company.



Communication between producer and consumer

In this event information create access-control that he secured data will be processed multiple domain in large complex event processing systems. This will allow defining the obfuscation threshold as an access policy avoids all the access restrictions and deliver the events. The number of events will be increased application will be react quickly thus the increase of complex event processing systems can be utilized.In this proposed system we derive access-requirements by selecting the event attributes for access-policy. This will allows the requirements for a chain of dependent operators in G.

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Access-policies:

Access-control will allows for specified access-rights to set of all event attributes. These Access-Rights are given by the event stream produces and gives the operators based upon Access-Requirement i.e. location or role or may be any of the event operators.Requirements are generally indirect properties for all the operators. Generally, we declare the access-rights within the Access-policy and here we declare the Access-policy as ACP for any operator ω define as set ofAttributes and Access-requirements as are.

Event Processing Overview:

Like Data Stream Management Systems (DSMS) CEP systems are designed to handle real time data that arrive constantly in the form of event streams. CEP queries are continuous in the sense that they are registered once and then run indefinitely, returning updated results as new events arrive. Due to low-latency requirements, CEP engines manipulate events in main memory rather than in secondary storage me-dia. Since it is not possible to keep all events in memory, CEP engines use moving windows to keep only a subset (typically the most recent part) of the event streams in memory. In addition to these features shared with DSMS, CEP engines also provide the ability to define reactive rules that fire upon detection of specific patterns. Ideally, CEP engines should be able to continuously adapt their execution to cope with variations (e.g., in arrival rate or in data distributions) and should be able to scale by sharing computation among similar queries.

Window Policies:

Moving windows are fundamental structures in CEP engines, being used in many types of queries. Windows with different properties produce different results and have radically different performance behaviors. Window policies determine when events are inserted and removed (expired) from moving windows and when to output computations.

Three aspects define a policy:

i.Window type: determines how the window is defined. Physical or time-based windows are defined in terms of time intervals. Logical, count-based, or tuple-based are defined in terms of number of tuples 2.

ii.Expiration mode: determines how the window endpoints change and which tuples are expired from the window. In sliding windows endpoints move together and events continuously expire with new events or passing time (e.g., “last 30 seconds”). In jumping or tumbling windows the head endpoint moves continuously while the tail endpoint moves (jumps) only sporadically (e.g. “current month”).The infrequent jump of the tail endpoint of jumping windows is said to close or reset the window, expiring all tuples at once. In a landmark window one endpoint is moving, the other is fixed, and events do not expire(e.g., “since 01-01-2000”).

ii.Update interval (evaluation mode): determines when to output results: every time a new event arrives or expires, only when the window closes (i.e., reaches its maximum capacity/age), or periodically at selected intervals. In general, commercial engines do not support all the combinations above.All the measures reported represent averages of at least two performance runs after the system reaches a steady state. Event Analysis: the process of analyzing suitably prepared events and their payloads and meta-data for useful information.

- Event Analytics: the use of statistical methods to derive additional information about an event or set of events.

- Event Transforms: processes carried out on event payloads or data, either related to event preparation, analysis or processing.

Tests Specification and Results:

In this section we discuss the results obtained after running the micro-benchmarks on three CEP engines. We emphasize that it is not our intention to provide an in-depth comparison of existing CEP engines, but rather to give a first insight into the performance of current products as a way to identify bottlenecks and opportunities for improvement. We focus on analyzing general behavior and performance trends of the engines (e.g. variations with respect to window size, tuple width, or selectivity).We ran our queries on three CEP engines, two of which are developer’s editions of commercial products and the other is the open-source Esper.

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Due to licensing restrictions, we are not allowed to reveal the names of the commercial products, and will call engines hence-forth as "X", "Y", and "Z". We tried multiple combinations of configuration parameters to tune each engine to its maximum performance (e.g., enabling buffering at client side, or using different event formats and SDK versions.

Methodology:

Tests consisted in running a single continuous query at the CEP engine. They began with an initial 1 minute warm-up phase, during which the load injection rate increased linearly from 1 event per second to a pre-determined maximum throughput4. After warm-up, the tests proceeded for at least 10 minutes in steady state with the load generation and injection rate fixed at the maximum throughput. Tests requiring more time to achieve steady state (e.g. using long time-based windows) had a greater duration.

• Event Tracking: where events related to some entity are used to identify state changes in Event Analysis Analytics, Transforms, Tracking, Scoring, Rating, Classification that entity.

• Event Scoring: the process by which events are ranked using a score, usually as a part of a statistical analysis of a set of events. See also Event Analytics

• Event Rating: where events are compared to others to associate some importance or other, possibly relative, measurement to the event.

• Event Classification: where events are associated with some classification scheme for use in downstream processing.

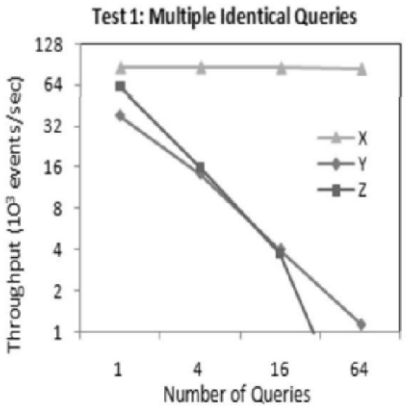
Benchmarks measure only steady state performance for a fixed number of queries, and do not consider issues such as adaptability and query plan sharing. SPECjms2007 is a benchmark produced and maintained by the Standard Performance Evaluation Corporation (SPEC) aimed at evaluating the performance and scalability of JMS-based messaging middle wares. SPECjms2007 thus focus on the communication side of event-driven systems rather than on query processing, which distinguishes it from our work.

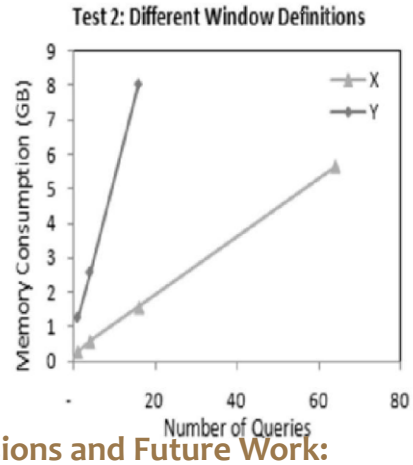
Multiple Queries (Plan Sharing):

The objective of this micro-benchmark is to analyze how the CEP engines scale with respect to the number of simultaneous similar queries. The query used in this experiment is a window-to-window join similar to Q3.

Test 1: Identical queries. In this test we focus on computation sharing and the main metric is hence throughput. Window size is fixed in 1000 rows. To keep output rate fixed (1 output per input event), all queries have a predicate whose selectivity increases as we add more queries.

Test 2: Similar queries with different window sizes. In this test we focus on memory sharing, so windows are large enough to observe differences when we increase the number of queries (in the range [400k-500k events]) and the injection rate is low so that CPU does not become a bottleneck.





Conclusions and Future Work:

Applications that are realized as EPNs typically process large amounts of events showing a complex interplay. We argued that this calls for appropriate formalisms and tools to analyze the behavior and performance

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Finally, the tests with multiple queries showed that plan sharing happened only in one CEP engine and only for identical queries (we still plan to broaden the investigation of this topic by incorporating tests with other. Another direction for future work is the derivation of EPNs .Our work addresses this demand by leveraging CPNs as a well-established formalism. Still, an automation of a net-based formalization of EPNs is hindered by several factors.First, despite the advancements on the formal definition of event languages, there is a lack of a generally accepted specification language for EPNs. Second, expressiveness of the languages used to define event contexts, evaluation policies, and the event detection logic is varying.

We showed, however, that these aspects have a large influence on the formalization. Further work is needed to consolidate the different approaches to EPN modelling, so that boundaries of any net-based formalization of EPNs can be made explicit. In this paper we presented a performance study of event processing systems. We proposed a series of queries to exercise factors such as window size and policy, selectivity, and event dimensionality and then carried out experimental evaluations on three CEP engines. The tests confirmed that very high throughputs can be achieved by CEP engines when performing simple operations such as filtering. In these cases the communication channel – in our tests, the client API– tends to be the bottleneck.

We also observed that window expiration mode had a significant impact on the cost of queries. In fact, for one of the tested engines the difference in performance between jumping and sliding windows in one test was about 4 orders of magnitude. With respect to joins, tests revealed that accessing data stored in databases can significantly lower the throughput of a system.Pre-loading static data into CEP engine offers good performance and may thus solve this issue, but this approach is feasible only when data do not change often and fit in main memory. The tested engines had disparate adaptability characteristics.We observed that the approach used to receive events from clients – either blocking or non-blocking – plays a fundamental role on that aspect, although further investigation is still required to fully understand this topic (e.g., testing bursts of variable amplitudes and durations or having changes in other parameters such as data distributions).

of model configurations for simulation once a CPN model has been created and validated for an EPN. That relates in particular to the application of data mining techniques to infer event distributions and dependencies between event producing components.

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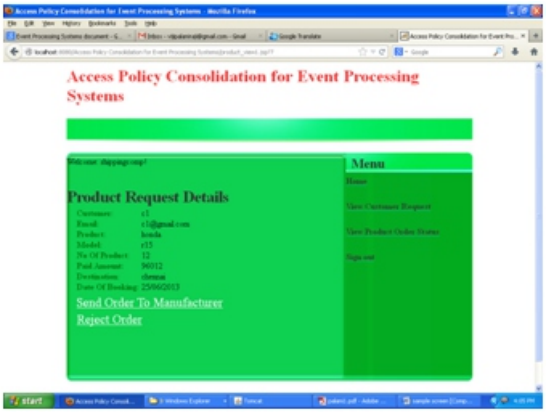

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