## Architecture for Real-Time Application of Knowledge Artifacts Context Event Service

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ARTAKA, the Architecture for Real-Time Application of Knowledge Artifacts, introduces a concrete technological blueprint for both provider heath IT and vendor organizations to incrementally introduce knowledge-based support artifacts into running production applications dynamically. This is made possible by serviceization of curated knowledge, then injected into a highly scalable backend infrastructure by automated orchestration. Knowledge compilation is defined as platform specific to permit vendor flexibility, in so far as implementations comply with ARTAKA's event communication and Health Service Platform packaging standards. Executable knowledge artifacts compatible with ARTAKA are a type of "agent" operating autonomously in *either* a stateless or stateful manner. CES utilizes Server Sent Events (SSE) for push messaging to client applications, and traditional REST for event publication and system management.

ARTAKA Context Event Service (CES) provides the glue for dynamic binding of client applications to knowledge-based backend infrastructure. This single mechanism is used to support intelligent orchestration of application experiences, as well as management of patient state when controlled by multiple disjoint client applications concurrently.

CES is the primary means by which *all* client applications – SMART-on-FHIR, non-FHIR, mobile, rich, systems, and others -- interface with running knowledge agents by means of brokering "context events": discrete, atomic topical occurrences by either a human or system actor on a real-world or simulated "timeline". CES allows for concurrent brokering of events

amongst different user sessions, agents, and even completely unrelated applications manipulating shared data models, all on different development cycles and release timelines. This decoupling allows pluggable backend services to indirectly drive user experience without any tight coupling between client software and backend agents.

| <b>SMART-ON-FHIR</b> , other web apps, mobile           | SMART-on-FHIR, other web apps, mobile <b>Native Mobile Apps</b><br>g. SMART-on-FHIR, other web apps, mobile e.g. iOS, Android |  | Other Services<br>Capabilities elsewhere in the enterprise SOA |                               |  |
|---|---|--|--|-------------------------------|--|
| Non-SMART Web C<br>Ordinary web apps unaware of S       | <b>Lients</b><br>SoF<br>Desktop applicatio  | <b>h Clients</b><br>ons for Windows, mac09 | Setc   |                               |  |
| REST API for:   | Server Sent Events<br>(aka "Push")  |  | ARTAKA   | INFRAS                        | STRUCTURE                                |
| <ul> <li>Event publication</li> <li>Security</li> </ul> | <ul> <li>Subscription based</li> <li>Real-time</li> </ul>   | Pub<br>Referen                             | /Sub Cluster<br>ce Implementation: Redis                       | <b>Tempor</b><br>Reference In | al Event Store<br>nplementation: MongoDB |
| ► Management  | ► UI orchestration  |  | subscribe  |                               |  |



Client-client chatter

# **Application Servers**

**Reference Implementation: Ruby on Rails** 

### Management Database

**Reference Implementation: PostgreSQL** 

Agent Cluster e.g. Drools, OpenCDS, CDS Hooks

Hot-pluggable agents for:

publish

read/write

- Executing formal knowledge
- Driving client UX orchestration
- Management patient state

Patient Corpora Cluster

Temporary non-authoritative patient data corpora for accelerated query, such as CQL, SPARQL, API4KP, SQL, FHIR etc.

read/write

read/write

read/write

Health Services Platform

### EXEMPLAR SEQUENCE



### Authoritative EHRs

### FHIR/Other Services

ARTAKA CES represents a portion of unpublished work at Arizona State University. Research committee attribution:

read/write

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