

Sensor Data & Analysis Framework

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Problem



- **Overwhelmed users spend precious time managing logistics of accessing diverse data sources and manually integrating data for basic analysis.**
 - **The number and size of the data sources is continually growing, only making this problem worse.**
 - **Time spent accessing and manually integrating data reduces the amount of time and effort left for needed analysis.**

Background



- **Improved data management techniques are needed to reduce the analysis timeline to enable more rapid and flexible analysis of diverse live and historical data sources.**
 - **Stream processing engines allow live data to be processed efficiently.**
 - **Established databases provide historical data management and tools for analysis.**
 - **Service oriented architectures permit scalability, and integration of emerging services and data sources.**

Research Overview



- **Goal**
 - **Make it easier for analysts to process large amounts of diverse data by investigating how to integrate multiple data sources.**
- **Objective**
 - **Analyst users will be able to more easily and quickly pose a question to diverse data sources by the end of the 2008 fiscal year, as measured by user feedback and recorded query time.**
- **Approach**
 - **Create a system that enables users to pose integrated queries on live and historical data sources without losing pedigree.**

Activities



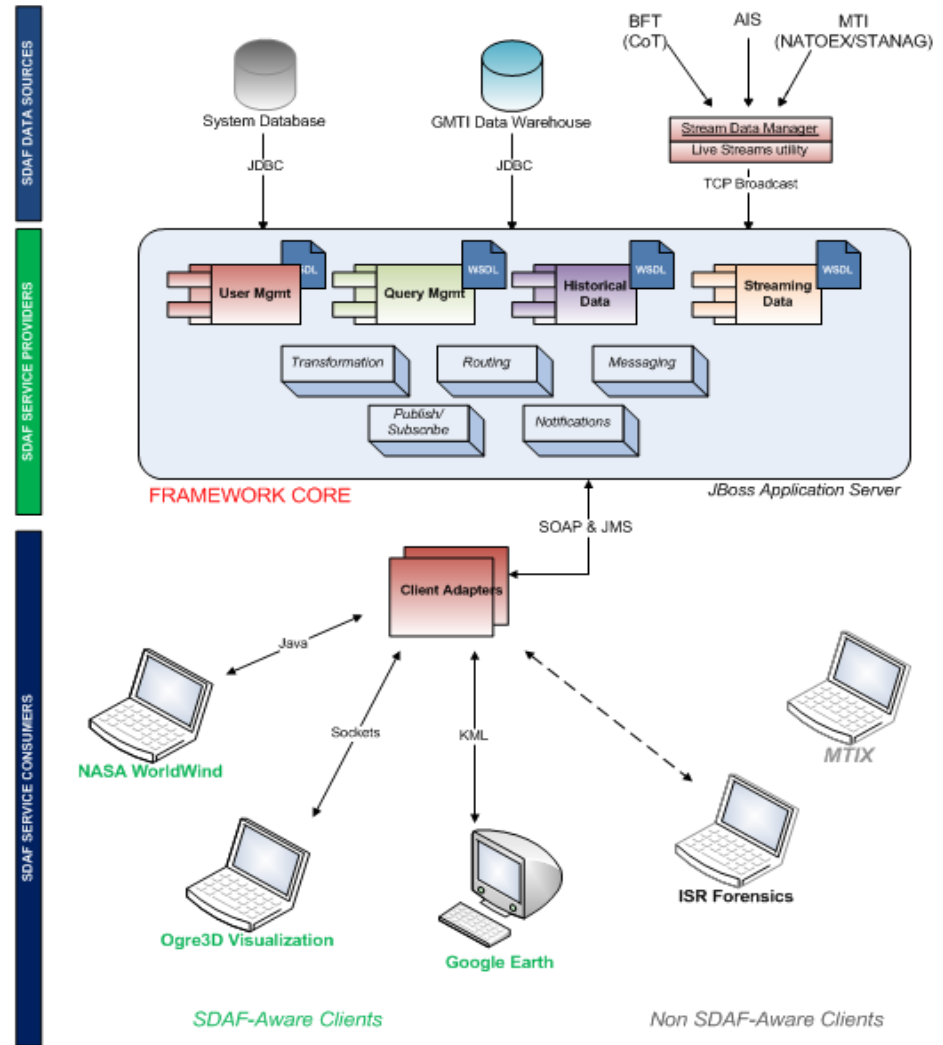
- **United States Army Operational Test Command**
 - Effort requires processing and visualizing test data formats to support army tests during execution.
- **G080 National Intelligent Surveillance Reconnaissance Programs**
 - Effort involves streaming AIS data through SDAF to support maritime domain awareness (MDA).
- **Deployed system with the USAF 753rd ELSG in the classified C2 Enterprise Integration Facility.**
 - Test the system on CEIF data sources.
- **Cooperating with the AFRL at HAFB.**
 - Developing algorithms that would plug into our system to provide data and stream mining services for the user.

SDAF

An event driven service oriented architecture (SOA) based framework.

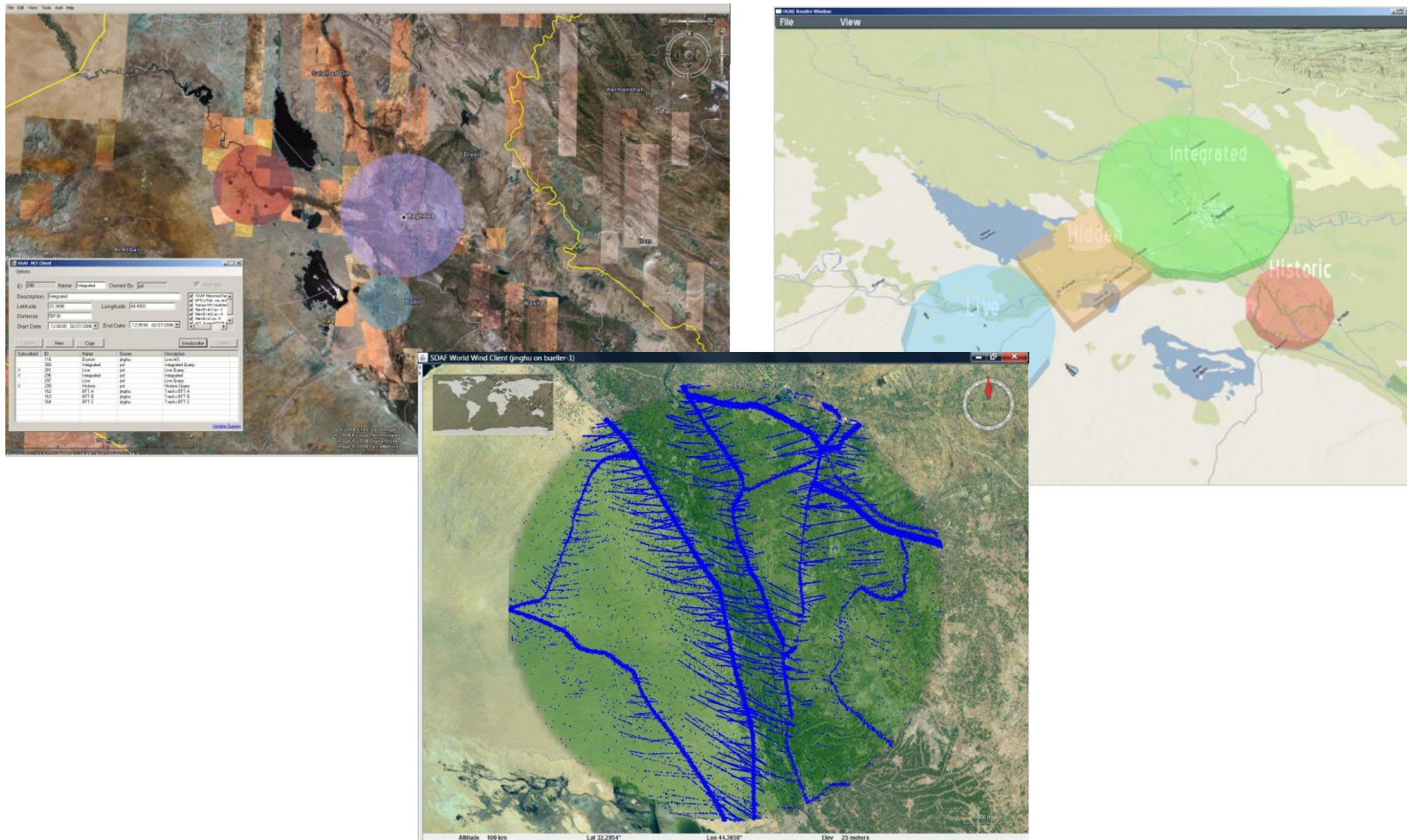
- Features multiple **SDAF Service Providers**.
- Manages diverse, dynamic queries.
- Can add data algorithms as services.
- Scales to support different data sources & clients.

SDAF SERVICE-ORIENTED ARCHITECTURE (SOA) OVERVIEW v2.0



Demonstration

- Users can pose shared integrated queries to diverse live and historical data sources via their preferred clients.



- **US Air Force E10A Program**
 - Gathered valuable lessons from stream processing engine and data caching techniques evaluation.
- **US Air Force 753rd ELSG at Hanscom AFB**
 - Developed and adapted framework for assistive analysis of moving target indicator (MTI) data.
- **US Army Operational Test Command**
 - Assist test analysts in rapid system evaluation through application of SDAF system.
- **US Air Force Joint Stars Program**
 - Provide analysts with a real time debrief capability.

Future Plans



- **Continue applying SDAF to relevant domains needing the integrated query on diverse live and historical data sources capability.**
- **Additional research areas:**
 - **Performance analysis**
 - **Architectural alternatives & specialized delivery methods**
 - **Assist in data source coverage redundancy**
 - **Advanced stream mining for assistive analysis**
 - **Database analytics for correlation and stream mining support**
 - **Advanced data pedigree for information confidence**