The Cyc Analytic Environment™ (CAE)

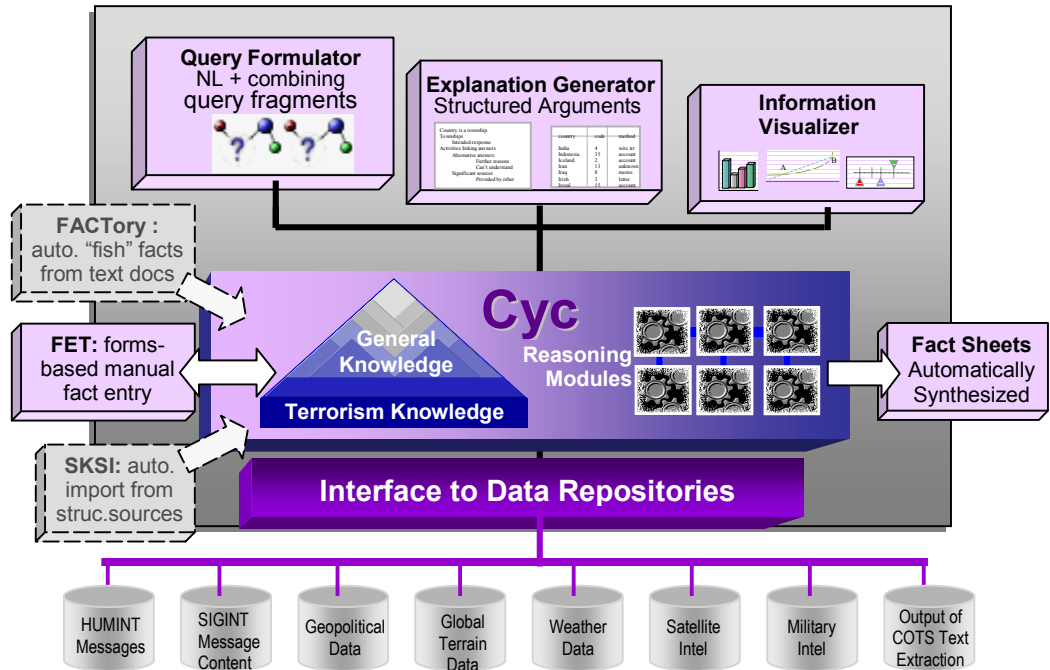## *A terrorism-domain knowledge base and question-answering system*

CAE is a terrorism **knowledge base,** not just a database: It terminates in fully parsed formal logical field values, not in free-form English text.

CAE contains over 300,000 open-source facts about:

- 2,700+ terrorists
- 800+ terrorist groups
- 14,000+ attacks

The Power of Inference

Each fact in the CAE is stated in a rich formal logic and associated with the source of the information (e.g. a website, DB, government report, etc.) The sources are embedded into a lattice of contexts, so the user can pick and choose which sources the system will use when generating the answers to their queries.

CAE contains the most salient information about each terrorist, group, and event. It represents dozens of structured pieces of data about each of those entities.

E.g., for each terrorist event:

- When and where and what type of attack it was
- Weapons and tactics used
- Individuals and groups involved, and which of hundreds of roles each of those played
- How many terrorists, civilians, guards, etc. were wounded, killed, captured; what buildings were damaged, destroyed; etc.

The Most Complete Open-source Knowledge Base Available in the Terrorism Domain

CAE contains a significant and growing fraction of all relevant open source knowledge about terrorist groups – their leaders, known members, ideology, sponsors, affiliations, facilities, locations, finances, capabilities, intentions, tactics, past actions – as well as detailed descriptions of specific terrorist events.

Answer the Tough Questions

Because CAE is powered by the unique capabilities of the Cyc commonsense and world knowledge base, and inference engine, you can answer questions about:

- Indirect connections among terrorism related entities. The CAE can efficiently find chains of a given length comprised of links of a specified set of reln.-types (e.g., *leaders, mentors, family-members*) between individuals / groups / events.
- Complex spatio-temporal reasoning. Dedicated reasoning modules support advanced reasoning about spatial and temporal subsumption.

Visualizations and Justifications

The CAE provides a variety of information displays, offering the analyst alternative views of the data, including maps, event timelines, relationship networks, and fact sheets about each terrorist, terrorist group, attack, country, etc.

Each answer is accompanied by a detailed, system-generated, narrative-style justification, with citation links to all sources that support the conclusion.

Hezbollah — July 1994

South America

▼ Search Results
  ▼ What terrorist attacks in South America in July 1994 are performed by Hezbollah?
    ▶ Simple Questions
    ▼ Complex Questions
      EVENT is a terrorist attack, EVENT happened in South America, EVENT occurred in July 1994, and Hezbollah deliberately performed EVENT
      EVENT is a terrorist attack, EVENT happened in LOC, EVENT's date is DATE, and WHO deliberately performed EVENT

How do I ask it a question?

Simply type a question or keyword.

CAE extracts relevant entities, and then offers one or more choices, based on its semantic interpretation of what you might have been asking.

CAE rephrases the query precisely.

Edit it if needed, and click Ask.

* *EVENT* is a terrorist attack,
* *EVENT* happened in South America,
* *EVENT* occurred in July 1994,
* and Hezbollah deliberately performed *EVENT*.

Ask
Save
Stop

Each answer has icons representing its sources, and direct links to those original sources.

Context: Anyti...
Results: All ▾ Time li... ...ore...

1 answer
Finished

Answers (1)

Answer	Sources
1994 bombing of the Amia Jewish Center in Buenos Aires	🖤 MIPT 📖

Answer: 1994 bombing of the Amia Jewish Center in Buenos Aire...

▼ **Because:**

1994 bombing of the Amia Jewish Center in Buenos Aires happen...
Buenos Aires, Argentina is in Argentina.
Argentina is a geographical subregion of South America.
1994 bombing of the Amia Jewish Center in Buenos Aires is a ter...

1994 bombing of the Amia Jewish Center in Buenos Aires occurre...

Hezbollah was a perpetrator in 1994 bombing of the Amia Jewish ...
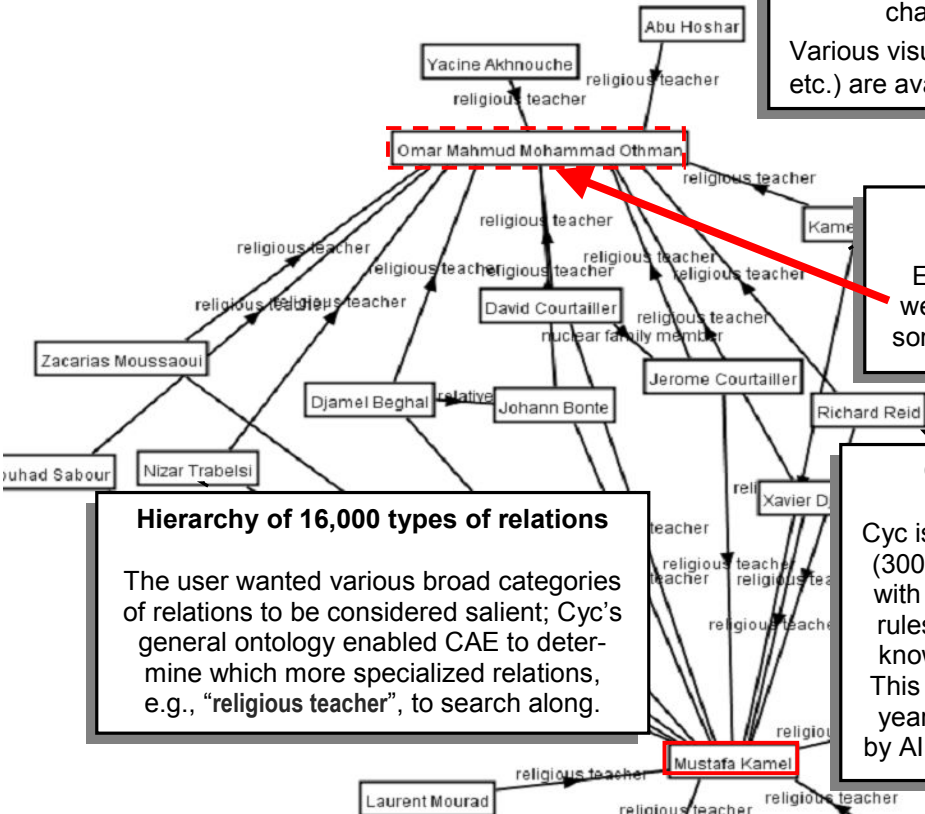
▶ **Detailed Justification:**
▼ **External Sources:**

[1] MIPT *MIPT Terrorist Attack Database 1968-1997, Oklahoma*
http://db.mipt.org/rand_68_97.cfm .

[2] *Hizballah: The "Party of God", The American Jewish Comm...*
http://www.ajc.org/atf/cf/{42D75369-D582-4380-8395-D25925B...

[3] 📖 Tehran Rising

[4] Jala Jaber, *Hezbollah: Born with a Vengeance*, 1997, Colu...

[5] "Hezbollah - Terrorist Organization of Global Reach", *Intel...*
2003, http://www.intelligence.org.il/eng/bu/hizbullah/hezbollah.htm...

[6] 🔺 Gary Gambill, "Dossier: Hassan Nasrallah", *Middle East In...*

Answers to your questions are accompanied by detailed **Justifications**: structured arguments that allow you to:

- Review the sources and the rationale for each answer
- Interactively fine tune answer sets by, e.g., approving or omitting individual sources or lines of reasoning
- Rank and filter the results based on your personal characterizations of source reliability (for such queries)

Various visualization options (maps, timelines, SNA graphs, etc.) are available including exports to Analyst's Notebook™.

Abu Hoshar

Yacine Akhnouche — religious teacher
religious teacher

Omar Mahmud Mohammad Othman

religious teacher — Kame...

religious teacher
religious teacher religious teacher
religious teacher
religious teacher religious teacher
religious teacher religious teacher religious teacher
David Courtailler
religious teacher
nuclear family member

Zacarias Moussaoui

Djamel Beghal — relative
Johann Bonte

Jerome Courtailler

Richard Reid

ouhad Sabour   Nizar Trabelsi

Xavier D...

Connecting The Dots

Exploring length-3 chains from Mustafa Kamel, we see that many of them lead to Omar Othman, someone who has no direct link to him in the data.

Hierarchy of 16,000 types of relations

The user wanted various broad categories of relations to be considered salient; Cyc's general ontology enabled CAE to determine which more specialized relations, e.g., "**religious teacher**", to search along.

CAE is built on Cyc®

Cyc is a unique resource: a huge (300k+ general terms) ontology with over 3 million hand-written rules spanning general human knowledge about those terms. This is the result of 800 person-years of effort, since 1984, led by AI pioneer Dr. Douglas Lenat.

religious teacher
religious tea...
religious...

religious teacher

Mustafa Kamel

Laurent Mourad — religious teacher
religious teacher
religious teacher

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