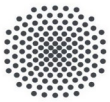

Universität Stuttgart
KI – Artificial Intelligence Institute
Analytic Computing

Hauptseminar Winter 2025/2026

Formal Methods for the Web

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Target Group

We expect participants to have completed courses covering basic topics of logic, algebra, set theory, and computer language theory. Experience on the Web, like the knowledge graphs course, is a plus.

The Topic

Initially, the Web was limited to a few scientific and technical areas. It is now universal. All information is moving online. Much of it was unstructured text data. Today, websites and web applications are recasting the data as semistructured XML, JSON, and RDF files. Diverse database systems interact in an ecosystem that integrates multiple data sources and services, requiring the definition of multiple standards.

The Web is not only about data but about communication protocols, people, and fairness. The W3C and community groups are constantly discussing and proposing new standards for the Web. These proposals are usually ambiguous collections of descriptions and use case examples. Vendors implement standards differently because of the non-agreement of what the specifications say. Formal methods have been shown to be the way to make standards understandable and accessible to developers and scientists.

In this course, you will learn and practice the foundations of the formal models for the Web and how to describe diverse types of elements, like computer languages, people's interactions in social networks, documents, data, and communication models.

Process

There will be regular lectures presenting formal methods for the Web, which will be alternated with student work. Students will read selected example papers formalizing Web standards, apply formal methods to unformalized Web standards, give a talk, and write a report (in English) summarizing their work. The report will be peer-reviewed by other participants.