

i-EDA

Internet Engineering Design Agents For Structural Modeling

The Internet Engineering Design Agent (*i*-EDA) System publishes the functional responses of physical systems, and components on the internet while protecting internal, proprietary, engineering design information. An example of the application of *i*-EDA is the functional response of structures. The prototype *i*-EDA application presented here is the assembly of a bridge structural span from other structural subsystems. The Span assembly shown below hides its proprietary engineering configuration while allowing access to the span assembly's functional response through the publication of a Span agent on the internet.

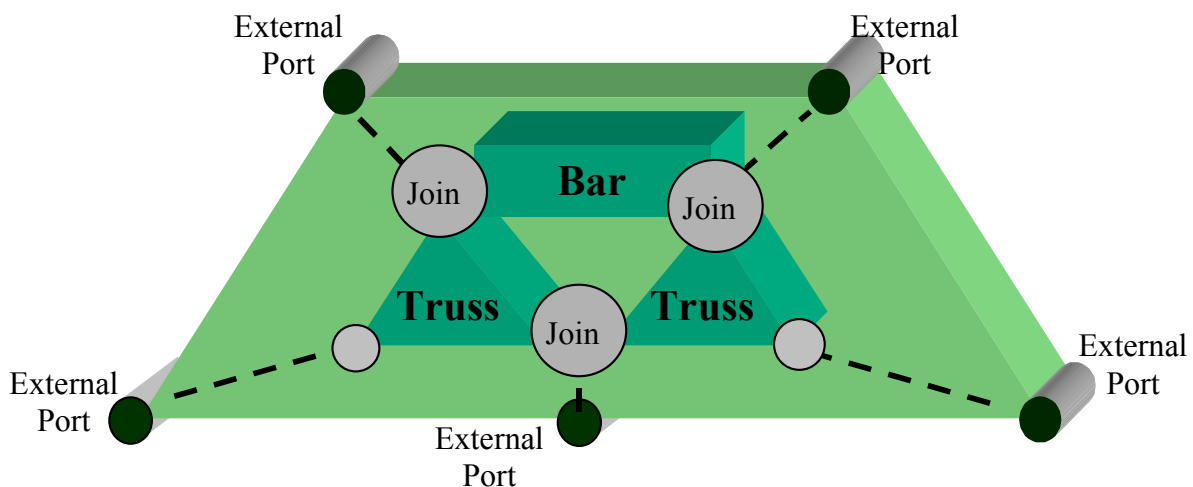


Figure 1: A Span Agent with Functional Response External Input/Output Ports Indicated Hides the Proprietary Configuration of Its Components

The Span Agent publishes its functional response through its response to queries. These queries are standardized both in format and transmission protocol. In the *i*-EDA system, queries only provide external functional response information referenced to the physical object's external connection ports. Internal configuration of the physical system is hidden because proprietary information is not available through the *i*-EDA systems standardized queries. For example, queries requesting size, color, weight, cost, delivery time, and external structural behavior are typical queries included in the system while queries requesting a list of components are not. A designer of the Span structure (Figure 1) would specify a set of component bars and trusses, assemble them using Join functions, and publish that assembly as an agent in the *i*-EDA system. Once assembled, the agent would use the designer's configuration and specified Joins to answer external functional response queries without divulging the design.

The *i*-EDA system uses an internet distributed system of agents (Figure 2) to answer design queries submitted through networked query clients. In the *i*-EDA system, a list of agents is available from the Agent Registry while valid queries are supplied by the *i*-EDA Query Ontology. Through the use of Joins, a model agent can assemble functional response information from agents representing its subsystems into the functional response of the assembly it represents. In Figure 2, the physical system represented by agent “*l*” includes physical components represented by agents “*l1*” and “*l2*”. For example, when assembling the response to a query requesting the weight of the assembly, the assembly agent queries its subsystems for their weight. The *i*-EDA system developers have developed methods for assembling a wide variety of functional responses including static structural deflections.

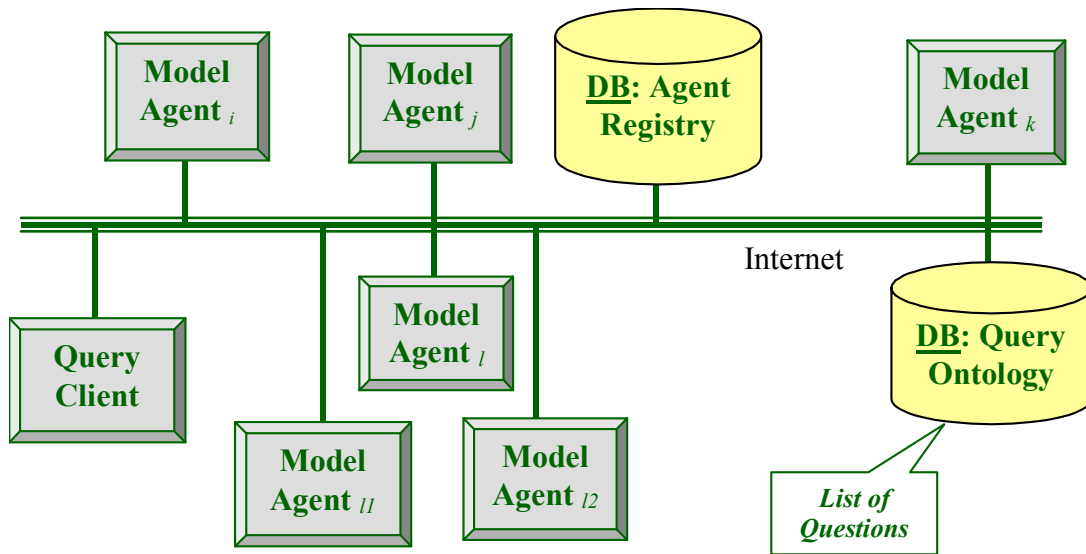


Figure 2: Internet Distributed Design Agents. Agent “*l1*” and “*l2*” are independent agents that represent physical subsystems of the assembly represented by agent “*l*” and are used by this agent to assemble answers to queries submitted to it by a Query Client.