SEMANTIC GRIDS

-

The W3C initiated a "metadata activity," which defines a standard for a metadata definition surrounding a Semantic Web. The Semantic Web is defined as the next generation of Web services.

The Semantic Web is an extension of the current Web in which information is given well-defined meaning, better enabling computers and people to work in cooperation. It's the idea of having data on the Web defined and linked in a way that it can be used for more effective discovery, automation, integration, and reuse across various applications.

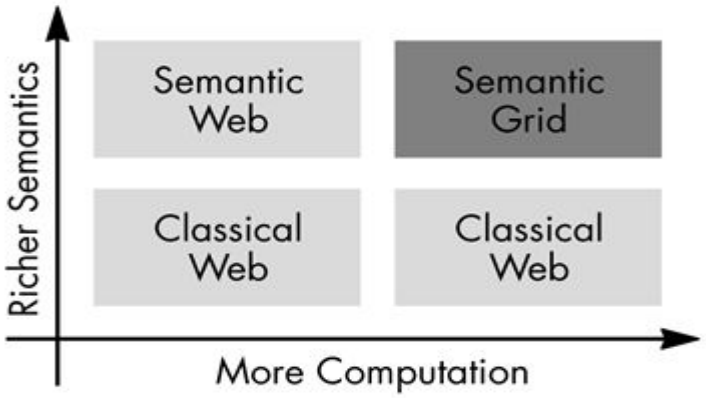

Figure 2.6 shows the semantic evolution. We will start exploring this evolution with the understanding of the Semantic Web.

The two most important technologies for building Semantic Webs are XML and Resource Description Framework (RDF). XML allows users to add arbitrary structure to documents through markup tags, but says nothing about the meaning of the structures. Meaning is expressed by the RDF, which encodes itself in sets of triples, wherein each triple represents the subject, object, and the predicate of an elementary sentence. These triples can be written using XML tags. The subject and object are each identified by a Universal Resource Identifier (URI).

An RDF document makes assertions that particular things, for instance, people and Web pages, have properties (e.g., "is a sister of" or "is the author of") with certain values (e.g., another person, another Web page). For further clarification consider the example, "Jeff is the author of the book ABC." In this example, the subject is "Jeff," the predicate is "the author of," and the object is "the book." This structure turns out to be a natural semantic, meaning to describe the vast majority of the data processed by machines. The RDF has, hence, evolved as a data mod for logic processing.

Another important aspect of the Semantic Web is the use of "ontology" to describe collections of information like concepts and relationships that can exist in many semantic situations. This semantic taxonomy defines classes of objects and relations among them.

Figure 4.7 illustrates the Semantic Web architecture layers. The real power of the Semantic Web will be realized when people create many programs that collect data from diverse sources, process the information, and exchange the results with other programs.

el

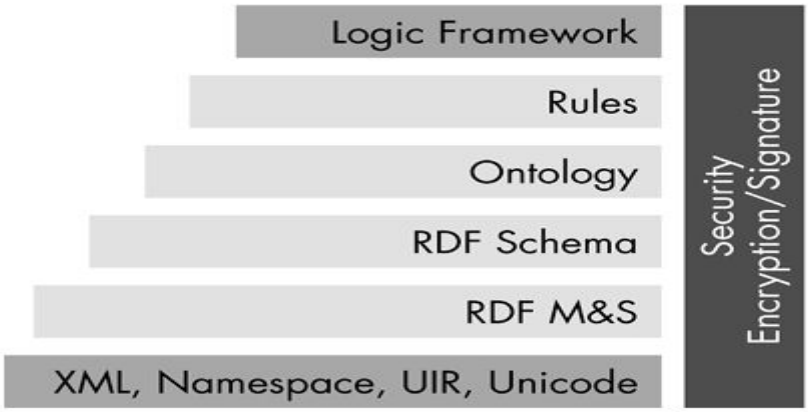

Figure 4.7. The Semantic Web architecture is shown in this illustration with the necessary security and encryption required across all levels.

The Semantic Grid[7] is a natural evolution in Grid Computing, toward a knowledge-centric and metadata-driven computing paradigm. The Semantic Grid is an effort to utilize Semantic Web technologies in Grid Computing development efforts, from the grid infrastructure to the delivery of grid applications.

These concepts will enhance more automated resource and knowledge/information resource sharing. Knowing this importance of the evolution of a Semantic Web and its usability in Grid Computing, the GGF has created a research group for Semantic Grid under the Grid Architecture area. We can find a number of Semantic Grid projects including Corporate Ontology Grid,[8] grid-enabled combinatorial chemistry,[9] Collaborative Advanced Knowledge Technologies[10] in the Grid, and many other significant initiatives.