Timber: A Native XML Database System

TECHNOLOGY NUMBER: 2780

Technology ID
2780

Category
Software
MOSS - Michigan Open Source
Support

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View online
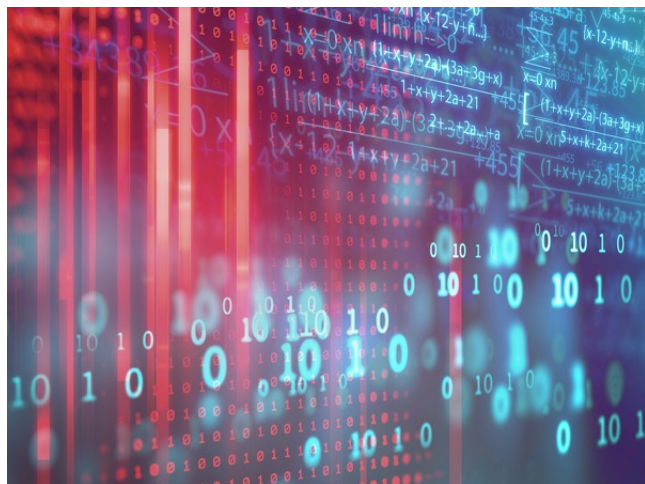
OVERVIEW

Native XML database system with modular, relational-like architecture and open-source availability

- Enables seamless integration of new features and greater flexibility via modular design
- Web data management, digital libraries, scientific data repositories, enterprise data integration

BACKGROUND

XML (Extensible Markup Language) has become a standard for representing structured and semi-structured data, widely used in web services, document management, and data exchange. Historically, XML data was managed either by mapping it to traditional relational databases or by using object-oriented databases, approaches that often necessitated complex translation layers and resulted in inefficient processing of tree-like XML structures. These methods struggled with efficiently supporting query languages like XQuery or XPath and maintaining transactional integrity. Relational databases, while powerful, are fundamentally table-oriented and cannot natively leverage the hierarchical nature of XML, leading to performance limitations and difficulty in handling evolving data schemas. This highlighted the need for a native XML database that could directly address the unique data models, query needs, and update requirements of XML, while also being extensible and easy to enhance as research and technology advance.

INNOVATION

Timber, developed at the University of Michigan, introduces a native XML database system built around a modular architecture mirroring that of relational databases. By reusing stable modules such as transaction management and innovating in areas like query processing and optimization, Timber efficiently supports the hierarchical structure of XML. Its algebraic, modular design streamlines both the addition of new features and the adoption of evolving standards in XML query languages. As an open-source project, Timber fosters collaboration and integration with the broader research and development community. Real world applications for this innovation span web data management, digital libraries, scientific data repositories, and enterprise environments—anywhere complex, changing, or tree-structured information must be queried and maintained with flexibility and efficiency. The open-source nature allows continuous improvement and adaptability to emerging data management challenges.

ADDITIONAL INFORMATION

PROJECT LINKS:

- Timber Project Site

DEPARTMENT/LAB:

- H V Jagadish, Electrical Engineering and Computer Science (EECS)

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