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Guest Editorial

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The ISO standard, Office Document Architecture (ODA), defines a machine and system independent way to represent and exchange structured, multimedia information. It was created in response to the growing need for heterogeneous systems to exchange documents containing multifont text, graphics of various kinds and sophisticated layout. The standard provides ways to go beyond text and graphics, and to expand the available media to accomodate audio, video and other content. Readable introductions to the standard can be found in a variety of places, such as the articles by Dawson [5], Hunter [8] and Ansen [1], or in a recent book by Rosenberg et al. [12]. For those unfamiliar with ODA, the following capsule summary will provide the reader with a basic understanding of the standard so that the articles in this issue can be read profitably.

ODA provides a way to represent a structured, multimedia document. A structured document is one that is organized around either a logical partitioning of a document, such as chapters, sections, and figures, or a layout partitioning of a document, such as pages, header areas and footnote areas. A multimedia document is one that contains multifont text, raster images and geometric graphics.

The logical structure of a document in ODA is represented by the *specific logical structure*, which is a tree. The internal nodes of the tree are called *composite logical objects*, and correspond to aggregations, such as a chapter or a titled figure. The leaves of the tree are called *basic logical objects*, and contain content: text, raster images or geometric graphics.

The layout structure of a document in ODA is represented by the *specific layout structure*, which is also a tree. The internal nodes of the tree can be page sets (collections of pages), pages and frames (of a page). These correspond to formatting strategies, such as collecting pages into an index, specifying multiple column layout or specifying the position of page headers. The leaves of the tree *blocks* and are used for positioning content.

Detailed information about a document is placed into *attributes* that are attached to the document's objects. For example, the attribute "indivisible" with the value "object type page" can be placed on a composite logical object and means that the entire subtree should be formatted on the same page.

The specific structures in ODA refer to a particular document. ODA also provides generic versions of logical and layout structures. The generic structures serve as prototypes or examples of documents. For example, a *generic logical structure* can define a "book" to be a table of contents, followed by any number of chapters, followed by an index. A particular book would have an actual table of contents, chapters containing the text of the book and an index that refers to the text in the chapters. A *generic layout structure* for a page could describe the amount of room to be left for headers and footers, and the number of columns to be used. A specific layout structure for a page resembles a page description language: the actual header, footer and column texts would be formatted at particular places, ready to be printed.

ODA uses a binary encoding of a document for storage in a file or transmission over a network. This encoding, called ODIF, is a compressed, context-sensitive, low-level representation of document information based on ASN.1. Another representation of ODA, called ODL, is based on SGML.

ODA is one of the application-layer standards in the OSI model that is starting to grow and flourish. ODA is being adopted in a variety of other standards to meet an enlarging set of needs. In addition to its standing as a member of the OSI application layer [10], it is being used to represent multimedia messages within CCITT standards via the aligned T.410 series of recommendations for

Open Document Architecture [4]. Further, ODA is one of the representations used for vendors to exchange graphical information for the CALS project, an ambitious project by the US Department of Defense to enable and accelerate the integration of digital technical information for weapon system acquisition, design, manufacture and support [2,3,11]. ODA is also specified as a cut-and-paste format that can be used by multimedia applications running under the X Window System [13]. In addition to already ratified standards, ODA is being proposed as one of the representations for medical record information within the IEEE MEDIX standard [9], for hypermedia information in the Dexter Hypertext Proposal [7] and for document interchange within US federal agencies [6].

The special issue starts by placing ODA in its setting of user needs for document exchange, and the standards intended to meet those needs. The first paper, by Bormann and Bormann, provides a perspective of where ODA fits into the growing collection of standards dealing with electronic documents. The article also shows the direction of related standards activities.

Different user communities have different needs, and ODA is a very large and general standard that is intended to meet a variety of requirements. Thus, different user communities may define an appropriate subset of ODA that fulfills their needs. These subsets are called *Document Application Profiles*, and several profiles are being explored. The second paper, by Spiceley, discusses some of the more popular profiles and their intended audiences.

A standard is irrelevant unless the standard can be shown to work and is put into practice. To ensure ODA's feasibility, a cooperative effort involving industry, European government and academia investigated the implementation and application of ODA while it was being developed. The third paper, by Nelson et al., discusses the history and accomplishments of the Piloting ODA (PODA) series of projects, along with a description of the next phase of activities for this cooperative effort.

The next three papers describe three specific implementations of ODA within three contexts. Each paper considers the needs of its user community, the need for a proper profile and the technical problems of converting between a particular native format and ODA. The paper by Golkar et al. gives a broad overview discussion of a translation system built at the University College London between a high-end, multimedia, document production system (SLATE) and ODA. The second implementation paper, by Kämper et al., provides a detailed technical discussion of their experiences implementing converters between ODA and a conventional word processor format, IBM's RFT : DCA. Both of these projects were carried out within PODA. The third implementation paper, by Rosenberg et al., reports on a different implementation experience: the US National Science Foundation's EXPRES project, which investigated electronic submission of research proposals.

The final paper in the special issue, by Cole and Brown, looks to the future of multimedia, when links and other organization forms become widespread. The longevity of a standard is determined, in part, by its ability to address future

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needs. The paper shows how the basic structure provided by ODA can be expanded for multiple document organizations.

We are seeing a growing need to connect together different information sources. ODA is a mechanism that can be used to help integrate different sources of multimedia information. Together, the papers in this special issue show how ODA can meet users' needs for communicating information among diverse systems.

References

[1] D. Ansen, Document architecture standards evolution, (Office Document Architecture for structuring and encoding documents), *AT&T Tech. J.* **68** (4) (1989) 33–55.

[2] US Department of Defense, Military Handbook, Computer-Aided Acquisition and Logistic Support (CALS) Program Implementation Guide, MIL-HDBK-59, December 20, 1988, p. iii.

[3] US Department of Defense, Military Specification, Requirements for Raster Graphics Representation in Binary Format, MIL-R-28002, December 20, 1988.

[4] International Telegraph and Telephone Consultative Committee, Blue Book Volume VII—Fascicle VII.6, Terminal Equipment and Protocols for Telematic Services, Recommendations T.400-T.418, November 14-25, 1988, pp. 8–478.

[5] F. Dawson and F. Nielsen, ODA and document interchange (Office Document Architecture standard), *UNIX Rev.* **8** (3) (1990) 50–57.

[6] U.S. Government Open Systems Interconnection Profile (GOSIP), Draft Version 2.0, May 1990, pp. 18–19.

[7] F. Halasz and M. Schwartz, The Dexter hypertext reference model, in: Proc. Hypertext Standardization Workshop, National Institute of Standards and Technology, January 16–18, 1990, pp. 95–133.

[8] R. Hunter, P. Kaijser and F.H. Nielsen, ODA: a document architecture for open systems (Office Document Architecture), *Comput. Comm.* **12** (2) (1989) 69–80.

[9] IEEE MEDIX P1157, ISO Medical Standards, unpublished draft.

[10] International Standards Organization, Information Processing—Text and Office Systems—Office Document Architecture (ODA) and Interchange Format, ISO 8613-1988, 1988.

[11] F. Spielman, Standards for the Interchange of Large Format Tiled Raster Documents, NIST 88-4017, US Department of Commerce, National Institute of Standard and Technology, December 1988.

[12] J. Rosenberg, M. Sherman, A. Marks and Jaap Akkerhuis, *Multimedia Document Translation: ODA and the EXPRES Project* (Springer, New York, NY, 1991).

[13] D.S.H. Rosenthal, Inter-Client Communication Conventions Manual, Version 1.0, MIT X Consortium Standard, 1989, p. 13.