



# DELAWARE STATE-WIDE INFORMATION TECHNOLOGY AND ARCHITECTURE STANDARDS

|                |                                 |
|----------------|---------------------------------|
| Standard ID:   | <b>AP-MIDL-001</b>              |
| Title:         | <b>Middleware</b>               |
| Domain:        | <b>Application</b>              |
| Discipline:    | <b>Electronic Collaboration</b> |
| Date updated:  | <b>2/14/2020</b>                |
| Revision no.:  | <b>9</b>                        |
| Original date: | <b>6/09/2005</b>                |

## Authority, Applicability and Purpose

- A. **Authority:** [Title 29](#) Chapter 90C Delaware Code, §9004C – General Powers, duties and functions of DTI “2) Create, implement and enforce statewide and agency technology solutions, policies, standards and guidelines, including as recommended by the Technology Investment Council on an ongoing basis and the CIO.
- B. **Applicability:** Applies to all State of Delaware communications and computing resources. DTI is an Executive Branch Agency and has no authority over the customers in Legislative and Judicial Branches, as well as School Districts, and other Federal and Local Government entities that use these resources. However, all users, including these entities, must agree to abide by all policies and standards promulgated by DTI as a condition of funding and continued use of these resources.
- C. **Purpose:** Determine and communicate the direction the State of Delaware is heading in middleware. The consolidation occurring in the IT industry along with the re-definition and re-classification of software solutions makes it very difficult to establish a precise direction or dictate specific products. This standard will attempt to enumerate some of the middleware products in use today and begin to steer the State towards a reduction in the number of solutions and the eventual selection of a middleware solution(s) useable by all.

## Scope

- A. **Audience:** This document is intended for Data Base Administrators, Systems Administrators, Network Administrators, Application Developers, and PC Support personnel. This document is not intended for use by non-IT personnel.

These standards are adopted by the Department of Technology and Information (DTI), through the Technology and Architecture Standards Committee (TASC), and are applicable to all Information Technology use throughout the State of Delaware. Any questions or comments should be directed to [dti\\_tasc@delaware.gov](mailto:dti_tasc@delaware.gov).



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- A. Applicability:** This standard will cover all middleware installed or in use by the State of Delaware, including data owned by the State but housed by third-party contractors. This standard does not apply to Traffic Control Systems, CAD systems, GIS systems, or computer systems where the Federal Government dictates the middleware to be used. Only general use middleware is covered by this standard, not proprietary use middleware such as laboratory, instrumentation, or CAD. Data integration between the State of Delaware and any entity outside of the State of Delaware. Also, it addresses data integration between and within State organizations.
- B. Environments:** This standard covers all servers, enterprise servers, PDAs, appliances and desktop middleware. Not covered:
- Networking software, terminal emulators, screen scrapers and other tools that programmatically emulate a workstation or browser
  - Application development tools, although some of these incorporate runtime middleware in their products
  - Message switches
  - Packaged applications and their embedded middleware of all types
  - Systems management, network management, and application management facilities

### Process

- C. Adoption:** These standards have been adopted by the Department of Technology and Information (DTI) through the Technology and Architecture Standards Committee (TASC) and are applicable to all Information Technology use throughout the State of Delaware.
- D. Revision:** Technology is constantly evolving; therefore, the standards will need to be regularly reviewed. It is the intent of TASC to review each standard annually. TASC is open to suggestions and comments from knowledgeable individuals within the State, although we ask that they be channeled through your Information Resource Manager (IRM).
- E. Contractors:** Contractors or other third parties are required to comply with these standards when proposing technology solutions to DTI or other State entities. Failure to do so could result in rejection by the Delaware Technology Investment Council. For further guidance, or to seek review of a component that is not rated below, contact TASC at [dti\\_tasc@delaware.gov](mailto:dti_tasc@delaware.gov).
- F. Implementation responsibility:** DTI and/or the organization's technical staff will implement these best practices during the course of normal business activities, including business case review, architectural review, project execution and the design, development, or support of systems.
- G. Enforcement:** DTI will enforce these best practices during the course of normal business activities, including business case and architectural review of proposed projects and during the design, development, or support of systems. These best practices may also be enforced by others during the course of their normal business activities, including audits and design reviews.
- H. Contact us:** Any questions or comments should be directed to [dti\\_tasc@delaware.gov](mailto:dti_tasc@delaware.gov).



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### Definitions/Declarations

#### I. Definitions

1. **Application Server** – An application server is a component-based product that resides in the middle-tier of a server centric architecture. It provides middleware services for security and state maintenance, along with data access and persistence.
2. **COM / DCOM** - COM (Component Object Model) is a computing premise where reusable functions or the business logic of an application are bundled as a component (usually a DLL) to be invoked whenever necessary by the presentation layer of the application. COM is executed at a local level, at the client's machine. On the other hand, DCOM (Distributed Component Object Model) runs at the server end, where you pass instructions to the DCOM object and get it executed over the network.
3. **Data Integration** – Data integration involves combining data residing in different sources and provides users with a unified view of this data.
4. **EDI** - (Electronic Data Interchange) The electronic exchange of trading documents (such as invoices and orders) to facilitate e-commerce. The two most widely used EDI standards are the United Nations' EDI for Administration, Commerce and Transport (EDIFACT) and the Accredited Standards Committee's X12. Originally conducted only through value-added networks, EDI is gradually moving to the Internet. It remains a popular means of business-to-business information exchange because of the maturity of established standards and the wide adoption of EDI-associated technologies. See EDIFACT and X12.
5. **JSON (JavaScript Object Notation)**: <https://en.wikipedia.org/wiki/JSON>
6. **Middleware** - Computer software that provides services to software applications beyond those available from the operating system. It can be described as "software glue". Middleware makes it easier for software developers to implement communication and input/output, so they can focus on the specific purpose of their application.
7. **REST (Representational State Transfer)** is an architecture style for designing networked applications, favored in mobile applications. Rather than using complex mechanisms such as CORBA, RPC or SOAP to connect between machines, simple HTTP is used to make calls.
8. **RMI** - (Remote Method Invocation) A Java technology that allows one application process to invoke services existing in another, remote application environment.
9. **SOAP** - (Simple Object Access Protocol) A protocol introduced by a group of vendors led by Microsoft. Designed to be simple, it creates transparent mapping of the Distributed Component Object Model (DCOM) interface definition language and Extensible Markup Language (XML) definitions. It provides the key transport technology for Web services, the next-generation paradigm for delivering applications as a set of Internet-enabled services.
10. **Web Server** - A Web server is a system that delivers content or services to end users over the Internet or local network. A Web server consists of underlying hardware, an operating system (OS) and software used to facilitate HTTP communication.

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- 11. Web Services** - A software concept and infrastructure — supported by most major computing vendors (notably Microsoft and IBM) — for program-to-program communication and application component delivery. The Web services concept treats software as a set of services accessible over ubiquitous networks using Web-based standards and protocols. A Web service is a software component that can be accessed by another application (such as a client, a server or another Web service) through the use of generally available, ubiquitous protocols and transports, such as Hypertext Transport Protocol (HTTP). Joint efforts between IBM and Microsoft, with the support of other vendors such as Ariba and Iona Technologies, have produced agreement on a basic set of XML-based standards for Web service interface definition, discovery and remote calling. They include:
- Web Services Description Language (WSDL) for describing Web service interfaces
  - Universal Description, Discovery and Integration (UDDI) as the means for users to publish and locate available Web services, their characteristics and interfaces
  - Simple Object Access Protocol (SOAP), which enables an application to call a Web service
- 12. WSDL** - (Web Services Description Language) A language that provides a document format and an Extensible Markup Language (XML) grammar for working with Web services. It is used to describe Web services interfaces for publication in a public registry based on Universal Description, Discovery and Integration (UDDI). The WSDL specification was introduced by Ariba, IBM and Microsoft in September 2000, and later submitted to the World Wide Web consortium (W3C) with a request that a W3C working group be formed to oversee its development.<sup>1</sup>
- 13. XML** - Extensible Markup Language (XML) is a universal format maintained by the W3C used for representation and transfer of structured data on the web or between different applications. The language uses a structured representation by allowing user to create custom defined tags according to XML Document Type Definition (DTD) standards. The structure of XML document can be represented in the form of a tree known as Document Object Model (DOM).
- 14. XML Firewall** - [https://en.wikipedia.org/wiki/XML\\_firewall](https://en.wikipedia.org/wiki/XML_firewall)

### J. Declarations

Middleware must:

1. Be tunable for performance and space maximization.
2. Be scalable.
3. Work within the State's IT Infrastructure.
4. Provide the ability to populate a metadata repository, when possible.

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<sup>1</sup> Gartner, Inc. - [http://www.gartner.com/6\\_help/glossary/GlossaryMain.jsp](http://www.gartner.com/6_help/glossary/GlossaryMain.jsp)



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5. Must be SOA enabled. Vendors must be able to demonstrate the readiness of their product for SOA compatibility.
6. Reference the [Application Programming Language Standard](#) for additional information



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### Definitions of Ratings

| COMPONENT RATING   | USAGE NOTES   |
|--|---|
| <b>STANDARD</b> – DTI offers internal support and/or has arranged for external vendor support as well (where applicable). DTI believes the component is robust and solidly positioned in its product life cycle. | These components can be used without explicit DTI approval for both <b><u>new projects</u></b> and <b><u>enhancement</u></b> of existing systems.   |
| <b>DECLINING</b> – Deprecated - DTI considers the component to be a likely candidate to have support discontinued in the near future. A deprecated element is one becoming invalid or obsolete.                  | Via the State's waiver process, these components must be explicitly approved by DTI for <b><u>all projects</u></b> . They must not be used for <b><u>minor enhancement</u></b> and <b><u>system maintenance</u></b> without explicit DTI approval via the State's waiver process. |
| <b>DISALLOWED</b> – DTI declares the component to be unacceptable for use and will actively intervene to disallow its use when discovered.   | No waiver requests for new solutions with this component rating will be considered.   |

- A. Missing Components** – No conclusions should be inferred if a specific component is not listed. Instead, contact the TASC to obtain further information.

### Component Assessments

In many cases, the Components listed below are the standards themselves, not products. In those cases, there is no clear leader in this area, and so no product is recommended at this time.



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|                 | Component                              | Rating    | Comments                     |
|-----------------|--|-----------|------------------------------|
| <b><u>A</u></b> | <b>Middleware</b>                      | Standard  | MOM, RMI                     |
|                 | EntireX (Broker)                       | Standard  |                              |
| <b><u>B</u></b> | <b>COM, DCOM, EDI</b>                  | Declining |                              |
| <b><u>C</u></b> | <b>Web services</b>                    | Standard  | (XML, SOAP, WSDL,JSON, REST) |
|                 | EntireX (Broker, WebMethods)           | Standard  |                              |
|                 | WebMethods<br>Integration Server       | Declining |                              |
| <b><u>D</u></b> | <b>Securing data in middleware</b>     |           | XML firewalls                |
|                 | xWall/Sentry                           | Standard  |                              |
| <b><u>E</u></b> | <b>Application server</b>              |           |                              |
|                 | Websphere                              | Standard  |                              |
|                 | WebLogic                               | Standard  |                              |
|                 | JBoss                                  | Declining |                              |
|                 | TomCat                                 | Standard  |                              |
|                 | <b>Web Servers</b>                     |           |                              |
|                 | Apache                                 | Standard  |                              |
|                 | IIS                                    | Standard  |                              |
| <b><u>E</u></b> | <b>Data Integration</b>                |           |                              |
|                 | IBM DataStage                          | Standard  | General Release Levels       |
|                 | MuleSoft                               | Standard  |                              |
|                 | SQL Server Integration Services (SSIS) | Standard  |                              |
|                 | DPSync                                 | Declining |                              |
|                 | Natquery                               | Declining | Used w/DataStage             |
|                 | iWay                                   | Declining |                              |

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