Web, Database, and Application Server Bricks
v1.3

Status of this Memo

This document proposes a standard for the National Institutes of Health (NIH) and requests discussion and suggestions for improvements. Distribution of this memo is unlimited.
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1 Introduction

This document updates the NIH Technical Architecture Standard for application server bricks for the NIH community.

These revised bricks were developed based on baseline information provided by a survey for IC technologists that was distributed to all Institutes and Centers. Tactical and Strategic recommendations are based on analysis of those technologies coupled with research from Gartner analysts.

By establishing and following these standards, NIH can evolve towards a more homogenous server environment which can provide the following benefits:
- Allows technologists to develop deeper skills in fewer technologies
- Simplifies systems management because fewer operating environments need to be managed
- Positions NIH for better volume purchase discounts

The products designated for use are intended for applications running on server class machines. Smaller, locally used applications designed to support no more than 10 users are not covered by these specifications.

2 Web, Database, and Application Servers

Web servers are software that serve as engines which run websites. Through a Web listener, they accept HTTP (non-encrypted) and HTTPS (encrypted) connections from Web browsers. The Web server may return HTML based Web pages and other files directly to the browser, or may invoke additional software that performs processes such as database interaction and generates the returned HTML or files. In high volume environments, web servers are coupled with web load balancers for distribution of web traffic across several servers.

The **Online Transaction Processing (OLTP)** database management systems are largely defined by products that are suitable for a broad range of enterprise-level real time applications, including purchased business applications such as enterprise resource planning, customer relationship management, and customized transactional systems. These products are designed for performance in the applications they support. This performance mindedness tends to determine the designs of OLTP to activities that would not reduce performance such as large complex queries.

Data Warehouse (DW) database functional requirements contrast OLTP DBMS in that they support large databases, complex multi-table join processing and schema support, and have specialized index technology, workload management, and data partitioning capabilities. Most importantly, they support parallel capabilities (e.g., I/O, query and operations), and parallel utilities (e.g., backup/recovery and reorganization). DW databases are generally not real time data but support complex queries on large datasets. Due to their size, DW databases are frequently updated via over-night batch oriented processes.

An **application server** is a modern form of platform middleware. It is system software that resides between the operating system on one side, and the external resources — such as DBMS, communications and Internet services — on another side, and the users' applications on a third side. At runtime, the application server is to act as host (or container) for the user's business logic while facilitating access and performance of the business application. The application server must perform despite the variable and competing traffic of client requests, hardware and software failures, the distributed nature of the larger-scale applications, and potential heterogeneity of the data and processing resources required to fulfill the business requirements of the applications.

2.1 Web Server

This brick provides baseline information and the future direction for deploying web servers at NIH.

Table 1.   Web Server Brick

Tactical Deployment (0-2 years)	Strategic Deployment (2-5 years)	Emerging (Technology to track)
■ Apache 2.2 or newer ■ Microsoft Internet Information Server 7	■ Apache Future Versions ■ Microsoft Internet Information Server Future Versions	■ Evolving Free and Open Source (FOSS) products
Retirement Targets (Technology to eliminate)	**Containment (No new deployments)**	**Baseline Environment (Today)**
■ Apache 1.X ■ IIS6	■ Neon Shadow ■ Netscape Enterprise Server	■ Free and Open Source (FOSS) products ■ Apache ■ Microsoft Internet Information Server ■ Neon Shadow ■ Netscape Enterprise Server
Comments		
■ Tactical and Strategic products were selected to leverage NIH's investment in products that are a proven fit for NIH's known future needs. Leveraging baseline products in the future will minimize the operations, maintenance, support and training costs for new products. ■ Some baseline products have been designated as Containment. These products are either not as widely or successfully deployed at NIH, or they do not provide as much functionality, value, or Total Cost of Ownership as low as the selected Tactical and Strategic products. ■ Evolving open source products continue to Emerge as future technologies because open source developers have done a better job of modularizing their software, making it move feasible to combine components in order to produce a desired solution. ■ Apache is designated as Tactical / Strategic when used in conjunction with a Tactical or Strategic Server Platform and Server OS Brick. ■ .Net frameworks are supported by this standard via IIS standards, Windows core, and ASP.net		

2.2 OLTP Database Servers

The following bricks provide baseline information and the future targets for deploying Online Transaction Processing (OLTP) database servers at NIH.

Table 2.   OLTP Database Server Brick

Tactical Deployment (0-2 years)	Strategic Deployment (2-5 years)	Emerging (Technology to track)
■ DB2 Version 8 or better ■ Microsoft SQL Server 2005 ■ Oracle 11G ■ MySQL ■ Sybase	■ DB2 Future Versions ■ Microsoft SQL Server 2008 ■ Oracle Future Versions	■ TBD
Retirement Targets (Technology to eliminate)	**Containment (No new deployments)**	**Baseline Environment (Today)**
■ None	■ IMS ■ Microsoft Access ■ Other ■ Sybase	■ DB2 ■ IMS ■ Microsoft Access ■ Microsoft SQL Server ■ MySQL ■ Oracle ■ Sybase ■ Other
Comments		
■ Tactical and Strategic products were selected to leverage NIH's investment in products that are a proven fit for NIH's known future needs. Leveraging baseline products in the future will minimize the operations, maintenance, support and training costs for new products. ■ Some baseline products have been designated as Containment. These products are either not as widely or successfully deployed at NIH, or they do not provide as much functionality, value, or Total Cost of Ownership as low as the selected Tactical and Strategic products. ■ Evolving open source products are Emerging because open source developers have done a better job of modularizing their software, making it move feasible to combine components in order to produce a desired solution. ■ Oracle and Microsoft SQL Server are Tactical/Strategic for the current and previous releases and only when running on any of the operating systems/platforms designated as Tactical or Strategic in the Server Platform Brick. ■ DB2 is Tactical/Strategic when run on IBM-OS/390-zOS . ■ MySQL is designated as Tactical because, although it is not as functional and scalable as the databases listed in Tactical and Strategic, it is open source and quickly gaining in usage.		

2.3 Data Warehouse Database Servers

The following table describes the products for use as data warehouse servers.

Table 3.   Data Warehouse Database Server Brick

Tactical Deployment (0-2 years)	Strategic Deployment (2-5 years)	Emerging (Technology to track)
■ DB2 version 8 or newer ■ Microsoft SQL Server 2005 ■ MySQL ■ Oracle 11G	■ DB2 future versions ■ Microsoft SQL Server ■ Oracle future version	■ Oracle / Sun Exadata ■ Column based databases ■ TBD
Retirement Targets (Technology to eliminate)	**Containment (No new deployments)**	**Baseline Environment (Today)**
■ None	■ None	■ Evolving open source products ■ DB2 ■ Microsoft SQL Server ■ MySQL ■ Oracle
Comments		
■ Tactical and Strategic products were selected to leverage NIH's investment in products that are a proven fit for NIH's known future needs. Leveraging baseline products in the future will minimize the operations, maintenance, support and training costs for new products. ■ Some baseline products have been designated as Containment. These products are either not as widely or successfully deployed at NIH, or they do not provide as much functionality, value, or Total Cost of Ownership as low as the selected Tactical and Strategic products. ■ Evolving open source products are Emerging because open source developers have done a better job of building modern features into their projects more quickly. ■ Oracle and Microsoft SQL Server are Tactical/Strategic for the current and previous releases and only when running on any of the operating systems/platforms designated as Tactical or Strategic in Server Platform Brick. ■ DB2 is Tactical/Strategic when run on IBM systems ■ MySQL is designated as Tactical because, although it is not as scalable as the other databases listed as Tactical and Strategic, it is open source and quickly gaining in usage. ■ This update adds some attention to the emerging field of column based data warehouse vs. traditional row based data management. In a sub category is the hardware based appliances that are purpose built to handle searches and joins to vast amounts of data. This trend will also affect data reporting tools as they adopt large table techniques for reporting.		

2.4 Application Server

This brick provides baseline information and the future direction for deploying application servers at NIH. The following classifications apply to standalone applications servers, not application servers that are included with a multi-tier COTS product.

Table 4.   Application Server Brick

Tactical Deployment (0-2 years)	Strategic Deployment (2-5 years)	Emerging (Technology to track)
■ Apache Tomcat 6 ■ Redhat JBoss ■ Macromedia ColdFusion ■ Microsoft Server 2008R2 (Server Core) ■ Oracle Application Server 11g	■ Apache Tomcat Future Versions ■ JBoss Future Versions ■ Microsoft Server Future Versions (Server Core) ■ Oracle Application Server Future Versions	■ SaaS ■ Cloud Computing

Retirement (Technology to eliminate)	Containment (No new deployments)	Baseline Environment (Today)
■ None	■ Neon Shadow ■ Other ■ WiTango Application Server ■ BEA WebLogic	■ Apache Tomcat ■ BEA WebLogic ■ JBoss Application Server ■ Macromedia ColdFusion ■ Microsoft .NET Server ■ Neon Shadow ■ Oracle Application Server ■ WiTango Application Server ■ Other

■ Tactical and Strategic products were selected to leverage NIH's investment in products that are a proven fit for NIH's known future needs. Leveraging baseline products in the future will minimize the operations, maintenance, support and training costs for new products.

■ Some baseline products have been designated as Containment. These products are either not as widely or successfully deployed at NIH, or they do not provide as much functionality, value, or Total Cost of Ownership as low as the selected Tactical and Strategic products.

■ Apache Tomcat, Macromedia Cold Fusion, Oracle Application Server, Microsoft .NET Server, and JBoss are considered Tactical/Strategic only when running on any of the operating systems/platforms designated as Tactical or Strategic in the Server Platform Brick.

■ BEA WebLogic has been acquired by Oracle and is integrated into Oracle Application Server in versions after 9i.

■ Apache Tomcat is somewhat limited – serves Java servlets and jsp files, does not support larger more complex J2EE/EJB objects.

■ WiTango Application Server is considered Containment because it is not widely used at NIH and doesn't offer advantages over the products selected as Tactical/Strategic.

■ Oracle currently has two Application Server offerings – The original Oracle 10i server family and the newly acquire Web Logic suite from BEA. Oracle has announced the path forward is the 11G versions based on BEA Weblogic.

3   References

For additional information about the NRFC process and/or the NIH Enterprise Architecture, please refer to:

1. NIH Enterprise Architecture Website – Web Server Brick
   http://enterprisearchitecture.nih.gov/ArchLib/AT/TA/WebServerBrick.htm

2. NIH Enterprise Architecture Website – Web Application Server Brick
   http://enterprisearchitecture.nih.gov/ArchLib/AT/TA/ApplicationServerBrick.htm

3. What is a Brick ? http://enterprisearchitecture.nih.gov/ArchLib/Guide/WhatIsBrick.htm

4. How to Create and Publish a Technical Standard at NIH
   http://enterprisearchitecture.nih.gov/About/Approach/StandardsDevelopmentProcess.htm

5. Apache Web Server Project http://httpd.apache.org/

6. Jboss Application Platform http://www.jboss.com/products/platforms/application/

7. Microsoft Windows Server 2008 Editions
   http://www.microsoft.com/windowsserver2008/en/us/editions.aspx

8. Oracle Application Server http://www.oracle.com/appserver/appserver_family.html

4   Contact
To contact the NRFC Editor, send an email message to EnterpriseArchitecture@mail.nih.gov

5   Security Considerations
In compliance with the Federal Information Security Management Act (FISMA) of 2002 and related NIST Special Publications 800-series and FIPS (Federal Information Processing Standards) on IT Security, all server implementations must include adequate security measures to ensure application and data integrity, availability and confidentiality

6   Changes

Version	Change	Authority	Author of Change
0.1	Original Template		Bill Jones and Jay Shah
0.2	Made changes in response to comments from the first distribution. Include adding a scope and changing the way open source products are		Bill Jones

	handled.		
1.0	Approved by ARB 5/25/2005.	ARB	Steve Thornton, NRFC Editor
1.1	Updates		Helen Schmitz / Joe Klosky
1.2	Minor stylistic changes		Kiley Ohlson
1.3	Updated document based on comments		Joe Klosky

7 Author's Address

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8 Summary of Comments

Comment:

For the Application Server Brick, ORS is using Microsoft ASP.NET version 2.0 (Windows Server 2003) and Microsoft ASP.NET version 3.5 (Windows Server 2008) for both the Tactical and Strategic timeframes and believe these should be added. Also add .NET Framework 4.0 to the Strategic and Emerging timeframes.

Response:

Net support addressed in comments

Comment:

For the OLTP Database Server Brick, and the Data Warehouse Database Server Brick, Tactical Deployment, RFC shows Microsoft SQL Server 2007, which we believe should rather be Microsoft SQL Server 2008. ORS intends to use Microsoft SQL Server 2005 for the tactical timeframe and believe it should be added. We recommend Microsoft SQL Server Future Versions be added to the Emerging timeframe.

Response:

Tactical is SQL2005, Strategic is SQL2008

Comment:

Web Database and Application Server Brick has the statement under security as follows:

"All server implementations must include adequate security measures to ensure application and data integrity through enforcement of authentication and authorization, adequate physical security of hardware, network connectivity that complies with security regulations and guidelines, and ongoing cooperation and communication with the vendor to apply fixes to any security vulnerabilities that may become exposed in time."

Our security team recommends that the following security statement be used in place of /or to augment, the current statements for the security sections found in the RFC:

"In compliance with the Federal Information Security Management Act (FISMA) of 2002 and related NIST Special Publications 800-series and FIPS (Federal Information Processing Standards) on IT Security, all server implementations must include adequate security measures to ensure application and data integrity, availability and confidentiality."

Response:

Updated

Comment:

NIHRFC0043 - Web, Database and Application Server Bricks

Section 2:
Web Servers - "In high volume environments or environments where uptime is critical regardless of volume, web servers are coupled......"

Table 1:
Baseline: Sun Java System Web Server is currently in use.
Tactical: Add Sun Java System Web Server; new HHS websites are being deployed regularly using this software.

Section 2.2 Text refers to OLTP and data warehouse, but section 2.3 covers data warehouse. The reference to data warehouse should be removed in section 2.2

Table 2:
Comments refer to MySQL as being designated tactical, but it is removed on the chart. We think it should remain tactical as MySQL is used as an application specific database for software used for system administration, and presumably others.

Table 4:
Last bullet - correct spelling "The original Oracle 10i server family and the newly acquired Web Logic from BEA."

Response:

NIH will at times adopt HHS standards if they meet the general business needs. NIH is also selecting technologies that meet local business and user requirements. Exceptions are available for Sun Java server.
Section 2.2 updated

MySQL updated to Tactical

Oracle name corrected

Comment:

For both the OLTP and Data Warehouse Database Server Bricks:

Tactical Deployment:
Change Oracle 11G to Oracle 10g or later. As of November, 2009, Oracle 11g R2 is just beginning to be released. Oracle 10g R2 is still a current release (as would be considered in the notes section)

Change Microsoft SQL Server 2007 to Microsoft SQL Server 2005 or later. There was not a MS SQL Server 2007 release. The latest release is SQL Server 2008. Some vendors are not actively supporting SQL Server 2008 yet, so 2005 needs to remain for tactical deployment.

Application Server Brick:

Tactical Deployment:
Change Oracle Application Server 11g to Oracle Application Server 10g or better. See the notes on database release above.

Strategic Deployment:
Change Oracle Application Server Future Versions to Oracle Fusion Middleware Future Versions

(Oracle Application Server 11g is included as part of the middleware product suite which includes WebLogic Server, Application Server, JRockit, and Tuxedo)

Response:

MS SQL 2005 is the current mainstream release in use at NIH. Tactical updated.

Oracle only sells version 11 at this time. The tactical remains consistent.

Fusion is a middle ware product, Oracle still markets web and application suites identified separately from middleware at this time.

Comment:

It would be helpful if the NIHRFC document referenced the NIHRFC's for prior versions of the bricks.

For the database and application server bricks, shouldn't older versions of approved products be included for retirement?

The comments to the database brick indicate that MySQL is considered tactical, but it is crossed out in the brick itself. There is no discussion as to if or why it should be eliminated, and considering it is owned by Sun/Oracle, perhaps it should remain an option.

For the Application Server Brick, shouldn't BEA WebLogic be moved from containment to Strategic and replace Oracle Application Server Future Versions, since it is the designated upgrade path for OAS?

Response:

Yes, addressed in prior section
NIH policy is move to containment for most end of life products

MySQL is tactical

Oracle has rebranded all BEA weblogic products. BEA does not exist on any current brands.

Comment:

The OLTP 2.2 database servers brick and some of the comments following it seem to be misaligned.

MySQL is designated for removal from tactical in the brick, but the comments afterward still describe it as designated tactical

Evolving Open Source has been removed from Emerging, but the comment #3 contradicts this
If the intent was to remove these items from the particular areas, I would recommend updating the comments too.

Response:

MySQL is tactical
There are not current Open source products in emerging. If you have one please send email to EnterpriseArchitecture@mail.nih.gov

Comment:

MySQL is crossed out of tactical but not listed in containment. It is also listed in the comments. I believe there is a fair following of MySQL in IRP so I question

whether it is valid to cross it out.

We also run DB2 on Power so I question whether it should be limited to zOS only as it says in the comments.

In comments for Table 4, Original Oracle 10i is spelled Original Oracle 10I. 10i and 10g should be lower case I believe (that's how it is on the Oracle web site).

Response:

MySql is tactical

Power is a processor, Z/OS is an operating system, DB2 will run on both of these scenarios. DB2 is very prevalent in the mainframe world in industry and NIH. It is less prevalent at NIH on other platforms. That is what the standard is attempting to clarify.