

State of New Jersey
Shared IT Architecture

J2EE Application Deployment
Policy and Procedures

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Overview

Objective

To ensure that the State of New Jersey has comprehensive policies and procedures governing the creation of applications in its J2EE environment, and that the State assigns roles and responsibilities to the required internal and external personnel. Aspects of the State's shared technical infrastructure are defined. The ultimate goal is to ensure the success of application development.

Scope

This document presents policies pertinent to the deployment of an application in the J2EE environment as well as detailed procedures to follow in order to effectively deploy an application in the State of NJ's Shared IT Architecture. The standards being developed are for the use of NJOIT personnel, state agencies and departments as well as consulting firms hired by the State of New Jersey to develop applications. Careful adherence to these policies and procedures as laid out in this document will result in compliant and efficient applications being developed as well as expeditious go-live times for those applications.

Key Roles and Responsibilities

Office of Information Technology

- Oversight and approval of this policy statement
- Provide the necessary resources to follow the [NJ Shared IT Architecture plan](#).

Business Unit

- Confirm adherence to the [NJ Shared IT Architecture plan](#).
- Communicate application requirements to appropriate stakeholders.
- Participate in application testing and quality assurance.
- Provide the necessary resources to facilitate completion of all required tasks.

Development Team

- Follow all development guidelines and standards.
- Deliver an application compliant with guidelines and standards that can be executed on the State of New Jersey Shared Server Infrastructure.

Policy Maintenance

Policy Acceptance

Prior to the assumption of application development for the J2EE environment, each stakeholder including all developers, consultants and/or employees of outside agencies is expected to familiarize himself/herself with the contents of the policies. The Business Unit Contact Person is responsible for emailing a note to sar@oit.nj.gov confirming that all necessary stakeholders have reviewed the policies.

Policy Maintenance

A copy of this [NJ Shared IT Architecture](#) document, as established by the Office of Information Technology, can be found at <http://www.nj.gov/it/ps/>. Comments about this policy, suggestions for changes to existing policy, and/or requests for creation of a new policy are to be submitted to the NJOIT Chief Technology Officer.

Policy Exceptions

The NJOIT Chief Technology Officer or his/her chosen delegate makes decisions about exceptions to policy after reviewing risk analysis recommendations made by the requesting party.

Exceptions are considered on an individual basis. Where appropriate, a risk assessment is performed to evaluate the threats, and extenuating circumstances associated with the exception and the impact of the exception on State owned applications and business processes. Requests for exceptions are made in writing

to the NJOIT Chief Technology Officer or one of his/her chosen delegates for evaluation and appropriate action.

External Development Requirements

Requirements Statement

It is the position of the State of New Jersey that any application being developed at an external location must meet State requirements for deployment in the State's Shared Infrastructure environment. Any application that does not meet the State's requirements and cannot be fully deployed in this environment will be considered incomplete. It is the responsibility of the firm or company that develops an application to ensure that it can be deployed and run successfully in the State's Shared Infrastructure environment.

The State of New Jersey requires that – when an application is being developed in an environment external to the State or in the State's shared information technology infrastructure – all the guidelines stipulated in this document must be followed. The only exception is the Desktop phase of application development.

Requirements for Web Applications

- 1.0 Complete the [System Architecture Review Survey \(SAR Survey\)](#)
- 2.0 Participate in the [Architectural Planning Meeting](#)
- 3.0 **Pre-Development Preparatory Tasks:** Once the Infrastructure needs are understood and documented, the appropriate development and deployment environment will be established via hardware and software installation and configuration.
- 4.0 **Development and Deployment Process in the J2EE Environment:** Design, Develop, Test, Deploy, and Document the Application
- 5.0 **Performance Monitoring:** Regularly monitor application performance
- 6.0 If applicable, [Transition the Application to the Maintenance Team](#)

1.0 System Architecture Review Survey (SAR Survey)

To assist the Business Unit, developers, consultants and Technical Units in considering application needs and to help ensure communication regarding new Web application development projects at their inception, the State conducts a [System Architecture Review Survey](#) in the form of questionnaires designed to focus the participant's attention on specific technical details of the proposed application.

This discovery phase is critical because it helps NJOIT plan for load on the network and Shared Server Infrastructure hardware, and this phase helps all stakeholders to understand the scope and variety of tasks that must be completed to ensure a successful application. Completion of this survey enables the successful implementation of an application for the shared J2EE environment by stimulating meaningful discussions early and often in the planning and development stages.

All project related teams – NJOIT and non-NJOIT – will use this survey document as a discovery tool when a user or developer initiates a Web application development project.

2.0 Business Case Review Meeting

A Business Case Review meeting is a requirement prior to the initiation of the application development effort, and, before the issuance of a [Request for Proposal \(RFP\)](#). Once the BCR Survey has been completed, the Architectural Planning Meeting provides an opportunity for all stakeholders to discuss the SAR Survey details and the impact of each decision. They can also identify appropriate support staff for a project. It is the responsibility of Application Business Owner or designee to coordinate the meeting via an email request to sar@oit.nj.gov. NJOIT policy stipulates that the meeting shall be documented.

Note: Overview of the Application Infrastructure (See Three-Tier Diagram)

The Office of Information Technology maintains the majority of the telecommunications infrastructure that serves all State offices and agencies throughout New Jersey. With few exceptions, NJOIT also provides one point of access to

an Internet Service Provider so that all state agencies have access to the Internet. For maximum security, NJOIT has also developed a three-tiered network architecture to enable agencies to provide business services securely over the Web. Within this secure network architecture, NJOIT maintains a shared application serving environment consisting of web, application, portal, policy, and directory servers as well as web enabling software for use by all departments and agencies.

The three-tiered network is designed as follows:

- Public Layer – Public facing; presentation layer
- Secure Layer – Business logic application code, and middleware products
- Core Layer – Residence of data – such as core resources, databases, directories, and desktops

Each layer is protected by a firewall, which serves to shield resources from unauthorized access. Firewalls are vigorously maintained by network engineers and security specialists.

Description of the J2EE Application Infrastructure

The application infrastructure has four distinct platforms, which are:

- Desktop
- Integration Test
- System Test
- Production

The desktop platform is where the initial development of an application takes place. Developers create and test their code on personal copies of web and application servers on the desktop, which is usually Windows OS based. Commonly, desktop machines also have data source connectivity, and if applicable, middleware software. Developers may do some preliminary sharing of work with their teammates here in preparation for moving to the integration test platform. Developers then move their application from the desktop platform to the integration test platform.

The Integration Test platform, is usually the first level at which code is executed on Solaris OS based Sun Ultra Sparc hardware and in a shared environment with other applications. The objective is to test in order to ensure that the entire application works to the satisfaction of the Development Team without negatively affecting the performance of the application server in general, or that of other applications in this shared environment.

The System Test platform, Solaris OS on Sun Ultra Sparc hardware, is where testing requiring fewer interruptions usually related to automated deployment activity is conducted. Activities here include demonstrations, load testing, user acceptance testing, and possibly hands-on training.

The Production platform, also Solaris OS on Sun Ultra Sparc hardware, is the final destination for fully tested and functional application code. At this point, the application is considered to be 'live.'

3.0 Pre-Development Preparatory Tasks: Establish Hardware, Software, and Configuration Environment

Note: Recommended Desktop Development Environment Specifications

The following policy is intended for the use of employees of NJOIT, state agencies and departments, and consulting firms hired by the State of New Jersey. However, this policy applies specifically to individuals, no matter what their capacity, who intend to develop an application that will ultimately be deployed in the State of New Jersey's J2EE environment.

When developing an application that will be deployed in the State's shared infrastructure, the code must be written to comply with J2EE standards. It must have the ability to be implemented on a Oracle/Sun Application Server that is running the same software and revision level as in the State shared infrastructure production environment. Be advised that all Java components are to run on the NJOIT Application Server layer not the Web Server layer. However, in the event that a special circumstance appears to require Java at the Web Server layer, approval by the Director of

Enterprise Hosting Services (EHS) is necessary.

NJOIT strongly recommends that all developers of an application that will run on the J2EE Shared Server Infrastructure (SSI) use a workstation that has the Oracle/SUN Application and Web Servers installed.

3.1 Application Setup Compliance

To help establish a desktop environment, the Application Development Team, in conjunction with the J2EE Server Administrators Team, must have a discussion, and, if necessary, an orientation meeting, to ensure successful implementation in Shared Server Infrastructure, the Development Team must follow the naming conventions, logging, and other instructions while building the application.

3.2 Community Information Resources: myNewJersey Portal Login and Web

Developer's Role

It is mandatory that each developer obtain, as soon as possible, a myNewJersey Portal login and access to the Web Developers role, a site which is the principal communication vehicle for development procedures and news within the Online Application Development Community. The procedure is as follows:

- A request for the Web Developers' role including the required information, contact name, business, full mailing address, telephone number, and email address, is submitted to deploy-request@oit.state.nj.us. This requirement is also outlined in "[WebDevelopers Role Request](#)."
- The requestor, through an automated application process, will receive additional instructions directly via email. It is also possible to receive this information by phone or by mail.

3.3 Establish Desktop Development Tools Environment

It is important to have a desktop that is robust enough to support the development tools.

Within NJOIT, installation of these tools is the responsibility of Desktop Support Group and requires the completion of the "[OIT Request for PC Hardware and Software Installs](#)."

A reasonably robust workstation is required that has ample RAM, hard drive space, and networking capabilities. Desktop Support can provide machine specifications. Sun also publishes minimum recommended machine specs at its Web Site.

3.3.1 Development Tool

Development outside of NJOIT can utilize other development tools as long as they are J2EE compliant and create a deployable EAR (Enterprise Archive file) that will run on the current Oracle / Sun version of the Application Server.

3.3.2 Web Server

The developer's desktop runs Oracle/Sun Web Server recommended in SAR meeting.

3.3.3 Application Server

The developer's desktop runs Oracle/Sun Application Server recommended in SAR meeting.

3.3.4 Middleware software

If applicable, developer's desktop runs application-specific middleware software.

3.4 Data Sourcing

3.4.1 Establish Data Source(s)

The Development Team in conjunction with its Database Administrator (DBA) has the responsibility of designing, establishing, and housing the development, test and production databases. When necessary, especially for Oracle data sources, to fully establish the data on an appropriate server, the Development Team and DBA communicate necessary technical

requirements to the J2EE Server Administration Team.

3.4.2 Establish Connectivity

The application code should point to the proper database at each phase of development. As various data sources exist, the Development Team must provide all appropriate database connection information to the J2EE Server Administration Team at least five days in advance of expected deployment. The server administrator, using information provided by the Development Team, configures database connectivity from the application server.

3.4.3 Database Accessibility

It is the responsibility of the Development Team to ensure that the database is accessible. If a new firewall rule needs to be established to grant access to the database, the Development Team and DBA must communicate this to the J2EE Server Administration Team so appropriate action may be taken. It is the duty of the DBA to make certain that the database is up and running. The Development Team must ensure that the application provides for an elegant exit when the database is inaccessible.

3.5 Establish Portal Presence

When access to the application through myNewJersey Portal is required, The Business Unit Application Owner and/or Business Unit Project Manager must discuss requirements with the Portal Administration Team at myNJ.Portal.Admin@oit.state.nj.us. Appropriate action will be taken.

4.0 Overview of Development and Deployment Process in the J2EE Environment

Application Development

Description/Task	Ref	Test Phase	Specification	Sign- Off
Design and Architect the Application	4.1.1	All	Use "SAR Survey" and other guides for assistance	N/A
Locally Develop and Test Application	4.1.2	Desktop	Use "SAR Survey" and other guides for assistance	N/A
Document Application	4.1.3	All phases	Reference to "System and Software Transition Task List" may be helpful	N/A
Establish Integration Test Server logins and Obtain Deployment Privileges	4.2.1	Integration Test	Send email to deploy-request@oit.state.nj.us	Developer, Project Manager
Establish Application Server to Datasource Connectivity	4.2.2	All	Follow directions in the referenced Section communication with DBA team (oracledba@oit.state.nj.us)	N/A
Deploy Web Server Files	4.2.3	All	See "Step-by-Step Deployment Instructions"	Developer , Business Unit
Deploy Application Server Piece via EAR file	4.2.4	All	See "Step-by-Step Deployment Instructions"	Developer
Implement Portal piece	4.2.5	System Test, Production	See Portal Administration for details myNJ.Portal.Admin@oit.state.nj.us	N/A
Quality Assurance	4.3	All	One must have a valid login ID	N/A

Description/Task	Ref	Test Phase	Specification	Sign- Off
Sign-off on Applications Adequacy	4.4	All	Electronic Attestation (Implementation Review)	Developer, Project Manager

The following sections contain policy and procedure details which are to be reviewed by all developers of an application which will be deployed in the Office of Information Technology's J2EE environment. See the "Step-by-Step Deployment Instructions" document for details.

4.1 Design and Development

4.1.1 Design and Architect the Application

The Development Team, with feedback from the Business Application Owner, and Business Unit Project Manager produces application design and architecture documentation, much of which would be part of System Documentation referenced in the "Transition Checklist." The topics addressed in the "Application Architectural Planning Survey," provide valuable technical specifics that aid in design.

A Web-based Application developed for the J2EE Environment may have, at least, four distinctive technical "pieces" that affect the coding. They are:

1. Datasource: Includes creation of, population of, and connectivity to datasource(s) of various types including Oracle, SQL Server, Adabas, CICS, MQ, and DB2.
2. Web Server : Includes HTML, Images, Javascript, Style Sheets, etc. The directory structure and location of these files is identified via the "Application Setup Form" and discussion.
3. Application Server : includes ALL Java code, as well as, connectors to third party products such as MQSeries, Log4j, Transaction Gateway, eForms, etc. The standards-compliant Application name is identified via the Application Setup Form and discussion.
4. Portal : includes the coding necessary to interface with an established myNewJersey Portal identity and presence.

4.1.2 Locally Develop and Test Application

Once the Business Application Owner is satisfied with the proposed application design, the Development Team, having the appropriate datasource connectivity established locally, develops and tests each Technical piece of the application on the desktop. At a point at which the application is deemed stable, it is strongly suggested that the application be deployed to the Integration server and tested there to ensure the application's compatibility with the J2EE environment. This is especially true for applications developed outside of NJOIT and/or with tools other than those recommended.

4.1.3 Document the Application

Throughout the development, to help with the debugging and future maintenance of the application, the application should be documented. Output displays can be added using log4j, or any other logging facility to the code to help debug the applications. Before production, there should be no displays in the application server log files with debugging messages of code trace information.

4.2 Application Deployment to Shared Server Infrastructure

4.2.1 Establish Integration Test Server Logins, and Deployment Privileges

NJOIT requires that Technical Project Managers and/or Lead Developers send a message to deploy-request@oit.state.nj.us listing names, employer, and email addresses of those developers who require Login ids, and deployment privileges to Integration Test. It is not necessary for all developers to obtain deployment privileges. Typically, the Lead Developer and a Backup require such rights. The deployment steps and procedures that must be followed are discussed in detail in the [Automated Deployment Instructions](#).

Each requestor receives a confirmation email indicating that deployment privileges have been granted.

4.2.2 Establish Application Server to Datasource Connectivity

The application code should point to the proper database at each phase of development. The development team must provide all appropriate database connection information to the Application Server Administrator. It is the responsibility of Application Server Administrator, using information provided by the development team, to configure the database connectivity from/to the application server.

4.2.3 Web Server Piece

4.2.3.1 Establish Directories

At each server level, one-time only, the Lead Developer must request, via an email to deploy-request@oit.state.nj.us, establishment of the necessary directories, as identified via the Application Setup Compliance discussion.

The requestor receives an email indicating that directories have been established.

4.2.3.2 Deploy Files

Those with login IDs may SFTP the application's Web Server piece, as necessary, to the appropriate server directories. This responsibility may be shared by the Development Team, Business Unit, and J2EE Server Administration Team. Absent SFTP permissions, developers may request assistance through deploy-request@oit.state.nj.us

4.2.4 Application Server piece, the Enterprise Archive (EAR) file

It is the responsibility of the developer to adhere to the NJOIT policy regarding the building of the Application for all Server Levels. Deployment of the application is accomplished via a deployable Enterprise Archive (EAR) file which is initially built on the developer desktop machine. It is imperative that the packaging of the EAR file is done with attention and adherence to any and all communicated standards and guidelines. (Available via the WebDevelopers myNewJersey channel.)

4.2.4.1 Integration Test Level

At the Integration Test level, NJOIT stipulates that developers with deployment privileges will accomplish successful deployment by following the steps outlined in the [Automated Deployment Instructions](#).

4.2.4.2 System Test and Production Level

At the System Test and Production levels, deployment is accomplished via a Lead Developer

email to deploy-request@oit.state.nj.us , and opening of a change record requesting promotion of the application from one level to the next. This is very often a one-line message similar to “Please deploy MyApp.EAR from Integration Test to System Test.”. Special or unique instructions may also be included in the note. See 4.4 Sign-off below.

The Application Server Administrator queues the EAR for the next scheduled automated deployment cycle. The developer receives an email containing server messages related to the deployment attempt

4.2.5 Portal piece

If necessary, a Test and Production Portal presence must be established via discussion with the Portal Administration Team.

4.3 Quality Assurance

4.3.1 Test Application

At every Server Level, each logic path through the application should be tested to ensure that, at a minimum, the database and application levels are in sync. It should be verified that each and every JSP is compiled successfully and all images and references are accurate.

4.3.2 Monitor Application

At the Integration Test level, developers must monitor the server engine logs in order to ensure that the application is error free. Those with a valid login may view the server engine logs.

4.3.3 Performance Assessment

At the System Test Level, and, occasionally at Production level, a load test or stress test of the application is mandatory to schedule a load test contact Quality Assurance team at deploy-request@oit.state.nj.us.

This test ensures that the new application will not impact negatively on other applications running in the shared environment. Developers and/or Business Unit Project Manager develop and execute load/stress testing scripts that mimic the application’s intended use. All parties involved (ASET, Development Team and Business Unit) must ensure that this phase of system test meets specified performance metrics.

4.4 Sign Off

Application promotion requires notification be sent via email to deploy-request@oit.state.nj.us sharing news of user, and Implementation Review (IPR) team acceptance. It is also required at this time that a communication be sent via email with Change Record, and certifying that the application is error free.

5.0 Performance Monitoring

It is the responsibility of EHS along with the Development Team to ensure that the application does not degrade server performance. Database access and performance must be monitored daily.

6.0 Handing Off an Application to the Maintenance Team

The State of New Jersey mandates that any application being developed for the State, and that will require the maintenance of said application by State employees, must adhere to all aspects of the tasks that are defined in the [Transition Checklist](#), which is available via the WebDevelopers Document Library.

Post-Production Roles and Responsibilities

- The Project Sponsor and Business Unit are responsible for routinely monitoring the operation of its applications. It is imperative that periodic testing be performed by the Business Unit to ensure that application remains in good standing. This is especially critical for low volume, low usage applications. For applications for which intense and increased usage is expected, it is highly recommended that a few tests be run before the start of this usage period.
- Business Units are responsible for monitoring and promptly responding to the feedback they receive from users.
- Business Units are responsible for ensuring that the J2EE Server Administrators have accurate employee contact information.
- The J2EE Server Administrators should inform the Business Units when there are planned system hardware and software upgrades, outages, and revisions. The impact of these changes needs to be articulated by the J2EE Server Administrators to the Business Units.
- It is the responsibility of the Project Sponsor to revise and test its applications after upgrades to the application server software

Glossary

People in the process, grouped by Business Unit (See Org Charts for additional detail)

Stakeholder – An individual with a vested interest in the success of the application development process.

User – Any employee, contractor, vendor, or business partner who accesses and uses State/NJOIT computing systems.

Agency Chief Technology Officer – The individual who has oversight and approval over this policy statement and is to provide the necessary resources to carry out the NJ Shared IT Architecture.

Project Sponsor – The party or parties for which the application is being developed. The sponsor is usually responsible for financial expenses related to the application.

Business Unit – a team with specific business needs that are to be fulfilled by the application.

Business Application Owner – Coordinates the functions and work activities at all levels of a business process, has the authority to ability to make changes in the process as required, and manages process end-to-end so as to ensure optimal overall performance. Is ultimately accountable for the effectiveness of a process.

Business Unit Project Manager – The individual responsible for communicating application requirements and related testing.

Technical Project Manager – An individual responsible for the creation and implementation of at least one technical piece of the application. May be an NJOIT employee or an Agency employee.

Development Team – The group of people responsible for developing the application. They may be either State employees and/or outside consultants.

Lead Developer – The person who is most responsible for the development of the application. The most application-aware member of the development team.

Developer – A member of the development team or anyone tasked with the coding of an application.

Application Designer – A specialized development team role bearing responsibility for app. design.

Application Tester – Any individual from business unit, development team who participates in the testing of the application functionality and integrity.

NJOIT Chief Technology Officer – The individual who has oversight and approval over this policy statement and will provide the necessary resources to carry out the NJ Shared IT Architecture.

Director, Enterprise Hosting Services (EHS) – The individual who has oversight and approval over EHS issues.

J2EE Server Administration Team – The team responsible for the hosting environment for web and application servers.

sar@oit.state.nj.us – The address where email is sent regarding NJ Shared IT Policy and AAP Surveys.

Deploy-request@oit.state.nj.us – The address where email is sent regarding deployment and associated topics

Application Server Administrator – The person responsible for Application Server hardware and software.

Web Server Administrator – Person responsible for Web Server hardware and software.

Database Server Administrator – Person responsible for the installation of DB Server software oracledba@oit.state.nj.us .

Performance Assessment Analyst – Person responsible for producing performance metrics.

Portal Administration Team – Team that manages the myNewJersey portal hardware, software, and content.
myNJ.Portal.Admin@oit.state.nj.us

Data Management Services' Database Administrator – The person who is responsible for overseeing the database connectivity process. A member of the Data Management Services Team

System Server Administrator – A person responsible for Garden State Network servers and connectivity.

Network Engineers / Network Analysts – Specialized System Server Administrators.

Security Specialists – Individuals focuses on hardware and software security issues.

Firewall Administrator – The person responsible for maintaining firewalls.

fwadmin@state.nj.us

Desktop Support Group – The team responsible for the installation and maintenance of OIT desktops.

Key Documents in the Process, in loose chronological order

(* Denotes a document that can be found by those who have the myNewJersey WebDevelopers role)

System Architecture Review Survey – Questionnaire designed to focus participant's attention of specific technical details of the proposed application.

***Three-Tier Diagram of Shared Server Infrastructure** – Overview of servers and communication paths.

***Web Developers Role Request Form** – Any member of a development team who wishes to assume the role of a web developer must provide the data on this form.

OIT Request for PC Hardware & Software Installs Form – Form to be completed in order for one to receive an NJOIT compliant workstation.

***Step-by-Step Deployment Instructions** – Checklist document that itemizes each step required for the promotion of code from desktop to the various Shared Server levels.

***Automated Deployment Instructions** – Document that explains when and how a deployment can take place and exactly what that deployment entails, as well as how one can request an application server restart.

Transition Checklist – Checklist outlining requirements for Application turnover.

WebDevelopers Document Library – Multiple documents representing guidelines, standards, help, etc.

Key Terms mentioned in this document

Application Server – An application server is a server software on a computer in a distributed network that provides the business logic for an application program. The application server is frequently viewed as part of a three-tier application, consisting of a graphical user interface (GUI) server, an application (business logic) server, and a database and transaction server.

Database – A database is a collection of data that is organized so that its contents can easily be accessed,

EAR – An EAR (Enterprise Archive) file is a JAR file that contains a J2EE application. A J2EE application is a group of Web modules that collectively perform as a single entity. JAR (short for Java Archive) files were introduced in the early days of Java as a means to conveniently package and distribute Java applications and components.

E-Mail – Electronic Mail systems both internal and external to the State of New Jersey.

Firewall – A hardware or software device that separates two networks.

SFTP – Secure File Transfer Protocol (SFTP), a standard Internet protocol, is the simplest way to transfer files securely between computers.

J2EE (Java 2 Platform, Enterprise Edition) – Is a Java platform designed for the mainframe-scale computing typical of large enterprises. Sun Microsystems (together with industry partners such as IBM) designed J2EE to simplify application development in a thin client-tiered environment. J2EE simplifies application development and decreases the need for programming and programmer training by creating standardized, reusable modular components and by enabling the tier to handle many aspects of programming automatically.

Shared Server Infrastructure – A group of servers clustered together for hosting and performance purposes.

Web Server – A Web server is software that uses the client/server model and the World Wide Web's Hypertext Transfer Protocol (HTTP), and serves the files that form Web pages to Web users (whose computers contain HTTP clients that forward their requests).