



Information Technology Services

ITS Project Office
RMIT ITS Application Development Standards and
Guidelines

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1 Introduction

1.1 Purpose

The RMIT ITS Application Development Standards and Guidelines document specifies RMIT best practice in application architecture including application services, processes and technologies. The purpose of this document is to set the standards and guidelines for central application development at RMIT and to define which technologies are preferred, acceptable, supported and prohibited. It is intended that this document will be a reference when new projects are being initiated and when major upgrades are under consideration for existing projects.

1.2 Audience

This document has three major audiences –

- Senior management of ITS
- ITS developers, both internal and contract
- Project Managers

1.3 Background

A consistent and organisation-wide approach to application development allows for significant savings in time, energy and money, as more effective and redundant approaches can be chosen over ways that may not have a proven track record.

This has been recognised for some time at RMIT resulting in a push within ITS in 2006 to standardise, where practical, all new custom-built applications and to ensure they are developed using Java. Progress has been made. However non-standard, emerging technologies in the Java space, for example, are still in use. As a result Application Services continues to support a large number of applications, created using a range of technologies.

Further work is required to ensure ITS applications share a common architecture. This document is the next step to ensure a common approach is adopted for all central application projects.

By following these guidelines, total cost of ownership of applications should be reduced:

- Applications should be easier to host since consistent technologies are being used
- Support staff need to know fewer technologies
- Solutions will integrate more efficiently with the student portal and future versions of PeopleSoft

1.4 Scope

This document defines appropriate application development languages, Java and .NET development standards, user authentication guidelines, application platforms, operating systems, and data and database standards.

This document does not address application security apart from architectural considerations (e.g. NDS and LDAP).

2 Definition of Classes

This section is intended to give an understanding of the terms used throughout this document. Unless otherwise stated these terms should be treated as being mutually exclusive.

Class	Definition
Preferred	This is the preferred technology for developing new applications
Accepted	This technology will be permitted if there is a compelling case why the preferred technology can not be used and the request has been signed off by the architecture team. Project Office maintains the signoff form
Supported	Applications have already been created using these technologies and the scope of the project is to enhance these applications. New applications should not be created using these technologies
Prohibited	No development in these technologies will be permitted. Technologies not in the above sections are implicitly prohibited until such time that ITS is prepared to implement them.

3 Application Development Language

Java is the preferred development language for new applications. It is a requirement that applications be developed in a services-oriented manner – i.e. no business logic in the web page – all business logic is to be separated out into business services that can be utilised by other applications.

Class	Product	Version	Notes
Preferred	Java	1.4	The preferred language for all enterprise class applications. Oracle Application Server 10.1.2 does not support Java versions higher than 1.4
Accepted	ASP.NET using C#	2.0	iExplore
Supported	ASP using VBScript	3.0	Applications including EOL, DTS (application), CSO WebFarm
	PHP		
	COBOL	3.1	Used for PeopleSoft processes
	SQR	4.3.4	Used for PeopleSoft processes and reports
	ABAP		Used for SAP processes
	Perl	4.6C	WebLearn
	ACE	5.x	Corporate Website
	Oracle Forms	9i	Student Issues, STS Admin
	PeopleCode	7.6	Used for PeopleSoft
Prohibited	MS Access	All versions	Not for enterprise systems or corporate data, may be appropriate for prototyping or proof of concept purposes only
	Application Engine		Used for PeopleSoft processes

4 Development Details

4.1 Model-View-Controller for Java

A model-view-controller (MVC) is a design pattern that allows the user interface (e.g. a web page) to interact efficiently with the underlying data model (e.g. a database or a persistence technology). This section refers to the Java MVC technologies that can and can not be used for development.

4.1.1 Model

The model allows direct management of data stored in an RDBMS using an object oriented programming language. The language performs manipulation and traversal of the database objects.

Class	Technology	Version	Notes
Preferred	Hibernate	3.2	Used for RPO and the preferred MVC for large applications
	EJB	2.0	Used for STS and Orbit
Supported	Spring persistence/Hibernate combination	2.0/3.0	Used for Rollup 3. Spring provides the services and wrappers for Hibernate
	ADF Business Components	10.1.3	Used in Student Leadership. Not compatible with Oracle Application Server 10.1.2 and is expressly prohibited for new development
Prohibited	Spring persistence TopLink	All versions	Spring on its own is not supported

4.1.2 View

The view renders the model into a form suitable for interaction, typically a user interface element.

Class	Technology	Version	Notes
Preferred	Tiles	3.2	Used for RPO and Student Leadership
Supported	JSF	1.0	Used for RPO and Equity but has performance problems.
	ADF	10.1.3	Used in Student Leadership. Not compatible with Oracle Application Server 10.1.2 and is expressly prohibited for new development
	AJAX	n/a	Used by Rollup 3 in a limited manner. Not recommended for new applications
	JSP with business or view logic SiteMesh		Used for STS Used for Rollup
Prohibited	Spring	All versions	

4.1.3 Controller

The controller processes and responds to events. These events are typically user actions, and may invoke changes on the model.

Class	Technology	Version	Notes
Preferred	Struts	1.x	Used for Rollup and is the preferred MVC for large applications
Supported	JSF	1.0	Used for RPO and Equity but has performance problems.
	Servlets	2.3	Used by STS, but ITS is looking to phase servlets out from the MVC layer
Prohibited	Spring	All versions	

4.2 Model-View-Controller for C#

The Model-View-Controller concept is less common in .NET and as such there is not the same number of competing frameworks.

4.2.1 Model

Class	Product	Version	Notes
Preferred	ASPX	Framework 2.0	ASPX page for presentation layer
Supported	ASPX	Framework 1.1	

4.2.2 View

Class	Product	Version	Notes
Preferred	ASPX .cs	Framework 2.0	All Business logic should reside in the CS. The CS should not be deployed, but rather the DLL that it compiles into.
Supported	ASPX.cs	Framework 1.1	

4.2.3 Controller

Class	Product	Version	Notes
Preferred	cs	Framework 2.0	The data layer should be separated into its own class. Data connection should be via a user that has access to views and stored procedures only.
Supported	cs	Framework 1.1	

5 User Authentication

All applications must authenticate users against NDS via LDAP. A Java API was written by ITS and this should be the primary method for authentication for all new projects.

The API is located on the file system at **I:\its\Releases\AS\LDAPAuth**. Access to the source code is available from the Java team lead if required.

It is intended for this module to be exposed as a web service for non-Java applications, including EOL and iExplore, to utilise as well. The plan is to implement the web service in 2007.

In addition, some applications are required to authenticate users that are not in NDS. For example DLS maintains a list of users who need access to DLS but who do not have NDS logins. In these circumstances the application should check LDAP before trying to authenticate through its own user list.

All applications that authenticate users against NDS place a load on the Novell infrastructure. For this reason Infrastructure Services should be made aware of planned implementations in order to assess the potential impact of the implementation.

6 Platforms

6.1 Web Server

Web servers serve up content to the client web browser.

Class	Product	Version	Notes
Preferred	Oracle HTTP Server	10.1.2	Used for all Java implementations
Accepted	Microsoft IIS	6.x	Used for all ASP and ASP.NET applications
Supported	Apache	2.x	Used for WebFarm, BEIMS and ARCHIBUS
	TeraText Web Server	4.3.9	Used for the RMIT corporate website
Prohibited	Microsoft IIS	< 6.0	Versions prior to 6.0 should not be used

6.2 Application Server

Application servers perform the processing logic in most web applications. These can either be hosted on the same box as the web server or they can be hosted separately.

Class	Product	Version	Notes
Preferred	Oracle Application Server	10.1.2	Used for all Java implementations
Accepted	Microsoft IIS/.NET Framework	IIS: v6.x .NET: 1.1 or 2.0	Used for all ASP and ASP.NET applications
Supported	BEA Tuxedo	6.5	PeopleSoft application server
	BlackBoard	6.x	BlackBoard application server
	Apache Tomcat	5.2	Equity
	TeraText	4.3.9	RMIT Website
Prohibited	Microsoft .NET Framework	1.0	Original version and not suitable for new development

6.3 Operating Systems

The current preferred operating systems at RMIT are Sun Solaris and Microsoft Windows.

Class	Product	Version	Notes
Preferred	Sun Solaris	10	Used all Java implementations
	Microsoft Windows Server	2003	
Supported	Sun Solaris	9	PeopleSoft, SAP Corporate Website
	Microsoft Windows Server	2000	
	Apple XServe	OS 10	Lectopia
Prohibited	Windows NT Server	4.0	Vendor support has ceased

7 Data and Databases

7.1 Database Development

Oracle is currently the preferred database management system for new applications. In addition there are several SQL Server implementations around the university mainly acting as back-end databases for Microsoft ASP and ASP.NET solutions.

Class	Product	Version	Notes
Preferred	Oracle	10g	Being used for Rollup
Accepted	SQL Server 2005	SP 3a	Potentially EOL Applications including EOL, DTS, CSO
	SQL Server 2000		
Supported	Oracle	9i, 8.x	Applications including PeopleSoft and SAP
	TeraText	4.3.9	Corporate website
	MySQL	4.x	Lectopia's database
Prohibited	MS Access PostgreSQL	All versions	Not for enterprise systems or corporate data, may be appropriate for prototyping or proof of concept purposes

7.2 Data Connections

The preferred method for data connection between Oracle databases is Oracle database links. Where live, up-to-date data from PeopleSoft is required the connection should be to UPRD. If not then the connection should be to URPT.

Connections to and from SQL Server should be made using SQL Server Linked Servers.

7.3 Data Integration

The use of text files (e.g. CSV, tab delimited etc) is strongly discouraged for security, consistency and efficiency reasons. This type of integration should only be used with the approval of the architecture team and security analyst.

If text files are used to upload data to SQL Server (i.e. their use has been approved) then DTS packages should be used as the upload mechanism.

If text files are used to upload data to Oracle (i.e. their use has been approved) then Oracle External Tables should be used as the upload mechanism.

Appendix A – Abbreviations

Acronym	Definition
ABAP	Advanced Business Application Programming (SAP)
ADF	Application Developer Framework (Oracle)
AJAX	Asynchronous JavaScript and XML
ASP	Application Server Pages (Microsoft)
CSO	Class Scheduling Online
CSV	Comma Separated Values
DLS	Distributed Learning System
DTS application	Document Tracking System
DTS packages	Data Transformation Services
EJB	Enterprise Java Beans (Sun)
EOL	Enrol Online
HTTP	Hypertext Transfer Protocol
IIS	Internet Information Server (Microsoft)
JSF	Java Server Faces (Sun)
JSP	Java Server Pages (Sun)
MS	Microsoft
MVC	Model-View-Controller
NDS	Novell Directory Service
PHP	PHP: Hypertext Pre-processor (The PHP Group)
RDBMS	Relational Database Management System
RPO	Results Processing Online
SQR	Structured Query Reporter
STS	Student Timetabling System
UPRD	RMIT PeopleSoft production
URPT	RMIT PeopleSoft reporting
XML	Extensible Markup Language

Appendix B – Quick Reference

Programming Languages	Java	ASP.NET C#	ASP/ VBScript	PHP	COBOL	SQR	ABAP	PERL	ACE	Oracle Forms	People Code	Access	PS App Engine
Model	Hibernate (Java)	EJB (Java)	Framework 2.0 (C#)	Spring/ Hibernate combo (Java)	ADF Business Comp. (Java)	Framework 1.1 (C#)	Spring (Java)	TopLink (Java)					
View	Tiles (Java)	ASPX.cs Framework 2.0 (C#)	JSF (Java)	ADF (Java)	AJAX	JSP (Java)	SiteMesh (Java)	ASPX.cs Framework 1.1 (C#)	Spring (Java)				
Controller	Struts (Java)	Framework 2.0 (C#)	JSF (Java)	Servlets (Java)	Framework 1.1 (C#)	Spring (Java)							
Web Server	Oracle HTTP Server	Microsoft IIS	Apache	TeraText Web Server	IIS V < 6.0								
Application Server	Oracle Application Server	Microsoft IIS/.NET Framework	BEA Tuxedo	Blackboard	Apache Tomcat	TeraText	Microsoft .NET Framework 1.0						
Operating System	Solaris 10	Windows 2003	Solaris 9	Windows Server 2000	Apple XServe	NT Server 4.0							
Database Development	Oracle 10g	SQL Server 2005	SQL Server 2000	Oracle 9i, 8	TeraText	MySQL	Access	Postgres SQL					

Legend

	Preferred
	Accepted
	Supported
	Prohibited