

2011

Technical Information IL 2.0

Technology Stack clarity with IP and licensing information/ terms of references

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1. Technology Stack clarity with IP and licensing information/ terms of references

Following shall be the Technology Stack used for operationally running the IL 2.0 system.

S.No.	Usage	Technology Stack / Tools Used	Ownership of Technology Stack / Tools Used	Licensing information
1	Base System	Imagination Learning Suite 2.0 (IL 2.0)	Imagination Learning Systems Pvt Ltd (ILS)	Commercial Licensed product, License to use is provided by ILS Licensing authority lies with ILS
2	Solution Development Platform	Java / J2EE	Oracle Inc.	Open for general usage under GPL
3	Solution Development Framework	Java Spring 3.0	SpringSource, a division of VMware, Inc.	Open for general usage under GPL
4	Front End	Internet Explorer 7.0 and Above, Mozilla Firefox or any other Internet Browser	Respective Organizations	Depending on the browser used
5	Application Server Platform	JBoss Application Server	Red Hat Inc.	Open for general usage under GPL for standard edition
6	Database/RDBMS Platform	MySQL Database Server	Oracle Inc.	Open for general usage under GPL for standard edition
7	Server Operating System*	Linux (any)	Red Hat Inc.	Open for general usage under GPL for standard edition

* The system is Server Operating System Independent, Linux is the proposed and recommended OS

Please note that the whole system can be made operational under the open licenses and there is no cost (upfront or going forward) for running the application from technology stack perspective.

2. Integration Features and facilities provided in IL 2.0

Following are the details of different integration parameters and their mapping with the features available in IL 2.0

S.No.	Integration Parameter / Requirement	Delivered through IL 2.0 ready made	Remarks
1	Integration with other ERPs or legacy	Through Excel/CSV based Extract	All the functionalities in IL 2.0 can take extracts in defined / undefined formats and extracts from existing systems can be taken out and can simply be uploaded

	systems	management	into IL 2.0 system. The upload functionality can also be automated through standard batch jobs.
2	RFID and other hardware cards such as smart cards or proximity based cards	Through Excel/CSV based Extract management	All RFID and other card-based systems are capable of giving extracts in any file format; those extracts can be used to upload into IL 2.0 manually or automatically through batch jobs. Custom seamless integration with specific hardware products can be done on case-to-case basis as part of the customization.
3	Email	API provided	A seamless integration API is provided in IL 2.0 to get integrated to any email system
4	SMS	API provided	A seamless integration API is provided in IL 2.0 to get integrated to any SMS gateways
5	Other Applications (Legacy Apps)	Through Excel/CSV based Extract management	All the functionalities in IL 2.0 can take or provide extracts in defined / undefined formats and extracts from other applications can be taken out and can simply be uploaded into IL 2.0 system. The upload functionality can also be automated through standard batch jobs. If a custom seamless integration is required, the same can be done on case-to-case basis as part of the customization.

Please note that any kind of Hardware or software integration can be achieved by the extract management utilities provided in IL 2.0, however if specialized integrations need to be done, those can also be achieved through minimalistic development/customization efforts.

3. Data Privacy - Security of Solution

The following table explains the data and information security in detail applicable on IL 2.0 as an application and other associated server, data center and network infrastructure.

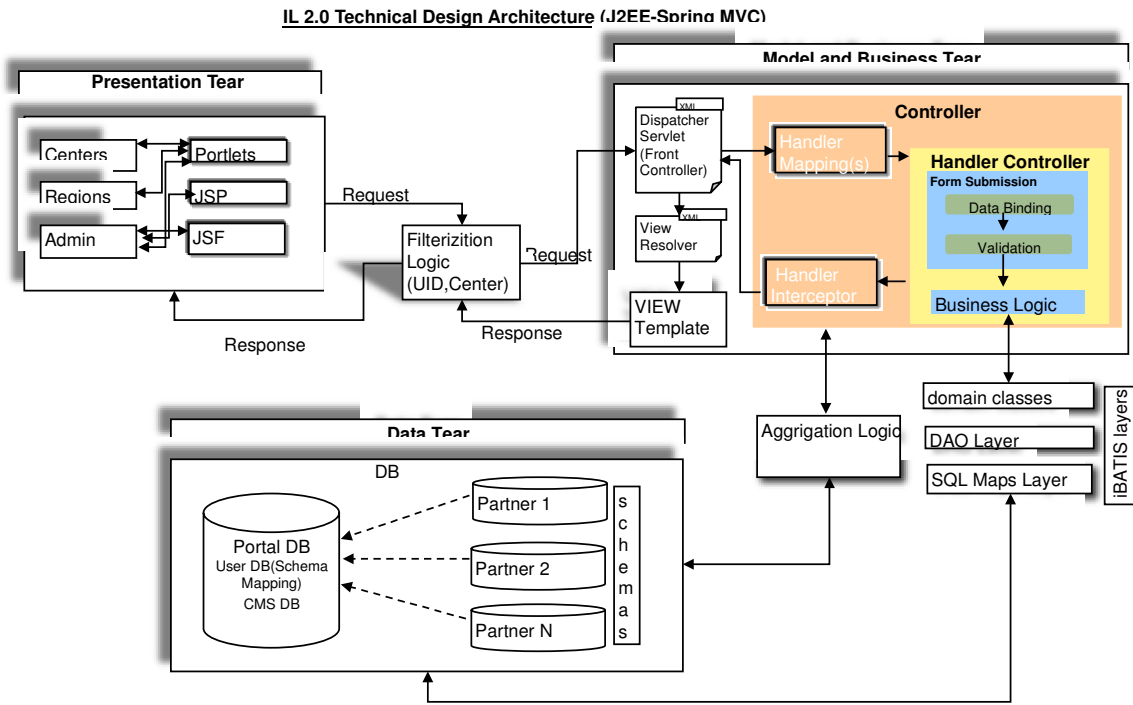
S.No	Security Requirements	Implemented at (Level)	Delivered through
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1	Authentication and Authorization	Application Level	<ul style="list-style-type: none"> • Single sign-on is implemented using secure cookies, redirection, encryption and session life-cycle management servlets • Spring Security Authentication and Authorization Service is used • Combination of Role based and User Based security is implemented • General Security Service APIs are used where-ever applicable • Centralized Authentication Resource is used • For details refer to http://static.springsource.org/spring-security/site/features.html
2	Data and Information Security on Server Hard disks or Storage	Database/ RDBMS Level	<ul style="list-style-type: none"> • Native MySQL security framework is used • User level, and table level security can be implemented, any portion of data in the table can be secured from any particular user • Critical tables are secured through data encryption at table level, and this can be implemented on any table • Further security can be achieved by encrypted file system, which is supported.
3	Data Protection	Database/ RDBMS Level	<p>IL 2.0 is based on MySQL's powerful mechanisms for ensuring only authorized users have entry to the database server, with the ability to block users down to the client machine level being possible. SSH and SSL support are also provided to ensure safe and secure connections. A granular object privilege framework is present so that users only see the data they should, and powerful data encryption and decryption functions ensure that sensitive data is protected from unauthorized viewing. Finally, backup and recovery utilities provided through IL 2.0 and MySQL and third party software vendors allow for complete logical and physical backup as well as full and point-in-time recovery</p>

4. Robustness, Scalability, Availability, Maintainability, Architecture, Ease of use/Navigation

IL 2.0 is based on the technical architecture that is highly scalable to cater to the need of the any large University/College/Institute and its various roles using the system; the solution is sized to handle any number of users and students data on the system and underlying infrastructure. As it is IL 2.0 is already handling approx. 250,000 students as of now, largest single instance being of 100,000-student base, which proves the robustness of the software.

The following exhibit explains the technical architecture of IL 2.0.



**Partners referred in the DB schemas are the institutes/collages/schools/learning locations*

It is worth noting that the architecture is based on robust and proven JAVA MVC framework, wherein the whole system is tiered into Presentation Layer, Business Logic and Database Layer providing inherent scalability and robustness.

Apart from what already have been archived through the robust system architecture, the performance and scalability is also achieved using the following performance turning measures already incorporated in the IL 2.0 system.

S.No.	Performance and Scalability Area	Delivered in IL 2.0/Proposed Solution through
1	Network level performance and scalability	<ul style="list-style-type: none"> Hardware traffic managers are supported and can be used to redirect user requests to a farm of servers based on server availability, IP address, or port number All traffic can be routed to the load balancer, and then requests are fanned out to servers based on the balancing algorithm. This is fully supported by IL 2.0 Sorting of incoming requests into different priority queues, and the requests are serviced according to the priorities assigned to each queue
2	Application Server level performance management and	<ul style="list-style-type: none"> In IL 2.0 use of the SingleThreadModel interface for servlets is avoided: written thread-safe code instead. In IL 2.0 the ServletRequest.getRemoteHost() is avoided as its very inefficient, and can take seconds to complete the reverse DNS lookup it performs.

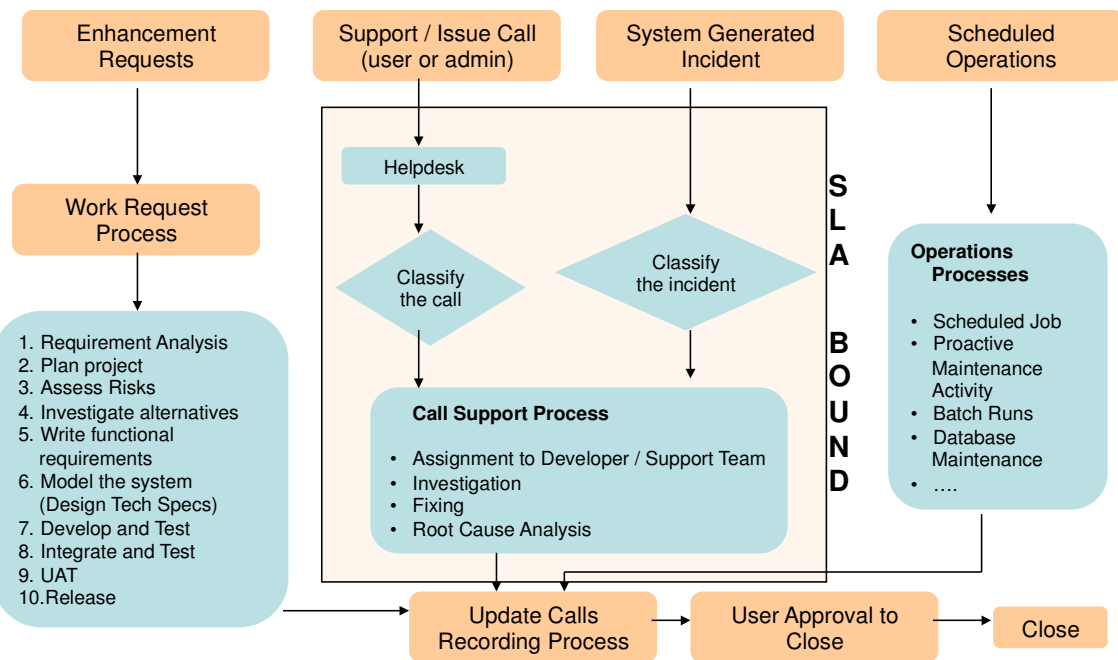
Scalability

- For read-only queries involving large amounts of data, EJB objects are avoided and JavaBeans as an intermediary to access manipulate and store the data for JSP access is used.
- Stateless session EJBs to cache and manage infrequently changed data is used. EJB is updated occasionally.
- A dedicated session bean is used to perform and cache all JNDI lookups in a minimum number of requests.
- Caching enabled on Portal Server and Web Servers

Ease of navigation is very much handled in IL 2.0 system as through the role management functionality, the specific user only see the screen and menus on which he / she is supposed to work, it becomes very easy for the person as he only sees what he is supposed to do and not everything where he has no work or permission.

5. Support Mechanism

Application Support - The following Exhibit explains the Application Support Mechanism in Details and the SLAs and other associated details will be submitted after further discussions on the system implementation



6. Bandwidth Utilization Framework of IL 2.0

IL 2.0 is 100% browser based and a very light on bandwidth; the following table explains the bandwidth requirements at various level of student base.

S.No	Student Base	Module Usage	Bandwidth
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			Requirements
1	Up to 5000 students	• Either academic modules or non academic modules being used	1 MBPS
		• All academics and non academics but not much LMS content	2 MBPS
		• All academics and non academics with LMS content	3 MBPS

7. Hardware Requirements of IL 2.0

Following are the typical hardware / server requirements on a base of 5000 students on a higher side perspective.

Server No	Server Role	Description	Proposed Configuration				
			Make and Model	HDD	RAM	CPU	RAID
1	Application Server	This server will host the entire business logic of the application, portals and would act as the presentation layer of the application	IBM/ HP/Dell Server Board	3*300	8 GB	2 * Zeon Dual Core/ Quad Core	Raid 5
2	Database Server	This server will host the MySQL Database	IBM/ HP/Dell Server Board	3*300	8 GB	2 * Zeon Dual Core/ Quad Core	Raid 5

The assumptions taken are as;

- The sizing is for per 5000 students for all the modules implemented
- Concurrency factor 1% for students and 5% teachers and 20% for non teaching staff
- If a college or school has high degree of learning content, the disk space needs to be looked upon

8. List of Modules

The list of modules available in IL 2.0 is as follows;

Modules	Sub modules
Portals	General Portal
	Student Portal
	Faculty Portal
	Staff Portal
	Top Management Portal / Dashboards
	Alumni Portal
	Parent Portal
	Recruiters Portal
Communication	Notifications
	Automated Notifications
	Collaboration
Setup	University/ Institute Setup
	Account Books Setup
	Payroll Setup
	Admission Setup
	Examination Setup
	Inventory Setup
Learning Administration and Management	Time Table
	LMS - Learning Management
	Student Attendance
	Distance Learning
Admission Management	Online Registration
	Merit List Management

	Entrance Exam
	Enrollment Handling
	Admission Cancellation/Transfers
Examination Handling	Exam Administration
	Student Evaluations
	Exam and Quiz
	Question Paper Management
	Question Bank
	Grades and Promotions
Financials	Fees Management
	Expense Management
	Financial Accounting
	Asset Accounting
	Budgets
	Audits Module
	Consolidation
Materials Management	Inventory Management
	Purchase and Supplier Management
	Sales Management
HRMS	Recruitments
	Leave and Attendance
	Payroll Processing
	Employee Performance Management
	Separation Management

	Training and Development
Statutory Compliance	Taxation
	Employee PF and Income Tax
Library	Library
Facilities Management	Transport Fleet Management
	Infrastructure Management
	Hostel Management
Event Management	Event Management
Student Training and Placements	Student Trainings