CI6225 – Enterprise Application Development
Individual Assignment 2

Technical Document
Travel Expense Reimbursement Application
V2.0
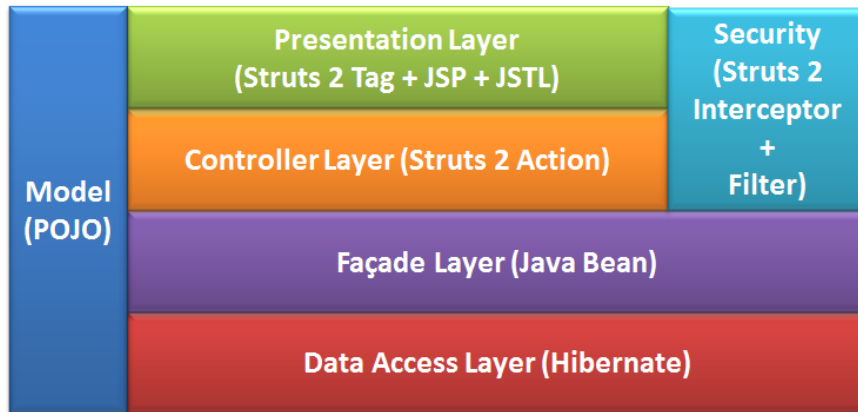
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Contents

1. Architecture
1.1 Multi-Layer Architecture

This application is based on multi-layer architecture design and implementation, for each layer, the responsibility is:

1) Data Access Layer
This layer is to handle the data interaction between Java application and database. It is using Hibernate Session Factory and Session to manager database connection and persistence.

2) Facade Layer
The façade is centralized the business logic by each module, such as User module, Department module and Claim Form module. It is also using a FacadeServiceLocator to assign façade to controller layer.

3) Controller Layer
It uses Struts 2 Action to handle to HTTP request from presentation layer.

4) Presentation Layer
It is using Struts 2, JSP, and JSTL to display content from controller. There is JavaScript and AJAX invoked to deal with validation logic.

5) Model
It is POJO plus the Hibernate mapping XML configuration to deal with ORM logic.

6) Security
Using Struts 2 Interceptor to handle user login status checking logic, also, a security filter is helping to checking the JSP page access also. CookieUtil is to keep application recognize user in 1 week.

1.2 Component Architecture
There are 3 components in this project:
1) Infrastructure Component
To handle all common function from DAO, Façade layer.

2) Application Component
To handle major business logic such as claim form, user, and department.

3) Report Component
To handle online report and download report logic.(Will not be included in this document)

2. Design Patten
2.1 MVC (Model-View-Controller) Patten
The view (Strut 2 tag, JSP and JSTL in presentation layer) is handling the display function; meanwhile the controller (Strut 2 Action) is handling the web flow logic from the input of the user action. Model (POJO) wrap the parameters to become object and transfer between view and controller, and finally persistent into database.

2.2 Singleton Pattern
For some of utility object, to reduce the frequency and quantity about the object instance, using singleton pattern to maintain only one copy of object.

2.3 Factory Pattern
Inside the report module, as there is more than 1 types of reports, using factory pattern to return the specify instance by input parameter.

2.4 Facade Pattern
Facade Bean (Java Bean) now is handling code of business logic in this application and hide the complexity of the logic, instead, to provide a simple interface.

2.5 Service Locator Pattern
There is a service locator uses a central registry for all of facade bean.

3. Detail Design (Infrastructure Class)
About more detail and completed class information, you can refer to this application's Java Doc.

3.1 BaseDao & BaseDaoBean

Class Name	BaseDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.infr.dao	
Attribute	SESSION_FACTORY : SessionFactory	
Method	buildSessionFactory() : SessionFactory	Initial Hibernate Session Factory
	closeSession(Session) : void	Close Session
	delete(E) : void	Delete Record in The Database
	delete(Long) : void	Delete Record in the Database
	getNativeQueryResult(String, Object[]) : List<ResultSetPojo>	Get native Query Result
	getQueryResult(String, Object[]) : List<E>	Gets The Query Result
	getQuerySingleResult(String , Object[]) : E	Gets The Query Single Result
	getSession() : Session	Get Session
	insert (T) : void	Insert a New Record in The Database
	returnNamedQuery(String, Object[]) : List<E>	Return Named Query
	selectAll() : List<E>	Update The Information of The Particular Object
	selectAll(String[], boolean) : List<E>	Retrieve All The Objects in The Database
	selectById(E) : E	Retrieve All the Objects in The Database
	selectById(Long) : E	Retrieve The Object Based on Id
	update(E) : void	Update The Objects in The Database

3.2 BaseFacade & BaseFacadeBean

Class Name	BaseFacadeBean	
Type	Facade Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.infr.facade	
Attribute		
Method	delete (E) : void	Delete Record in The Database
	delete(Long) : void	Delete Record in The Database
	insert(E) : void	Insert a New Record in The Database
	selectAll() : List<E>	Retrieve All The Objects in The Database
	selectAll(String[], boolean) : List<E>	Retrieve All The Objects in The Database
	selectById(E) : E	Retrieve The Object Based on Id
	selectById(Long) : E	Retrieve The Object Based on Id
	update(E) : void	Update The Objects in The Database

3.3 BaseAction

Class Name	BaseAction	
Type	com.opensymphony.xwork2.ActionSupport	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.infr.web.action	
Attribute	ACTION_AJAX : String	Static Variable for Ajax Action
	ACTION_CREATE : String	Static Variable for Create Action
	ACTION_DELETE : String	Static Variable for Delete Action
	ACTION_EDIT : String	Static Variable for Edit Action
	ACTION_LIST : String	Static Variable for List Action
	ACTION_VIEW : String	Static Variable for View Action
	REMEMBER_ME_COOKIE	Static Variable for Remember Me Cookie Action
Method	doGetCreate() : String	Handling Do Get Create Action
	doGetDelete() : String	Handling Do Get Delete Action
	doGetEdit() : String	Handling Do Get Edit Action
	doGetList() : String	Handling Do Get List Action
	doGetView() : String	Handling Do Get View Action
	doPostCreate() : String	Handling Do Post Create Action
	doPostEdit() : String	Handling Do Post Edit Action
	getFacade() : F	Get Façade Java Bean by Module specify
	getNewEntity() : E	Get new POJO Bean by Module Specify
	getSessionUser() : User	Get the User From Session
	removeSessionUser() : void	Remove User From Session
	setAccessRight(User) : void	Set The Access Right
	setClaimTypes(HttpServletRequest) : void	Set All Claim Types into Request
	setDepartments(HttpServletRequest) : void	Set All Departments into Request
	setErrorMessage(HttpServletRequest, String) : void	Set Error Message
	setFormStatuses(HttpServletRequest) : void	Set All Form Statuses into Request
	setMessage(HttpServletRequest, String) : void	Set Message
	setMonths(HttpServletRequest) : void	Set All Months into Request
	setOperationAreas(HttpServletRequest) : void	Set All Operation Areas into Request
	setRegions(HttpServletRequest) : void	Set All Regions into Request
	setSessionUser(HttpServletRequest, User user) : void	Set User into Session
	setUsers(HttpServletRequest) : void	Set All Users into Request
	setYears(HttpServletRequest) : void	Set All Years into Request

4. Detail Design (POJO Class)

About more detail and completed class information, you can refer to this application's Java Doc.

4.1 ClaimForm

Class Name	ClaimForm		
Type	**POJO**		
Package	**sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model**		
Attribute	id	Long	ID of Claim Form
	approvedByFinancial	User	Approved By Financial
	approvedByFinancial Time	Date	Approved By Financial Time of Claim
	approvedByManager	User	Approved By Manager of Claim
	approvedByManager Time	Date	Approved By Manager Time of Claim
	claimFormItems	List<ClaimFormItem>	Claim Item Details
	department	Department	Department of Claim
	formStatus	FormStatus	Form Status of Claim
	rejectBy	User	Reject By
	rejectTime	Date	Reject Time
	total	BigDecimal	Total amount for Claim Form
	travelOfMonth	String	Travel Of Month
	travelOfYear	String	Travel Of Year
	user	User	User Who Request This Claim Form

4.2 ClaimFormItem

Class Name	ClaimFormItem		
Type	**POJO**		
Package	**sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model**		
Attribute	id	Long	ID of Claim Form Item
	claimAmount	BigDecimal	Claim Amount
	claimDate	Date	Claim Date
	claimDescription	String	Claim Description
	claimForm	ClaimForm	Claim Form
	claimType	int	Claim Type

4.3 ClaimType

Class Name	ClaimType		
Type	**POJO**		
Package	**sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model**		
Attribute	id	Long	ID of Claim Type
	claimType	String	Claim Type of Claim
	claimFormItems	Set	Claim Form Items

4.4 Department

Class Name	Department		
Type	POJO		
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model		
Attribute	id	Long	ID of Department
	claimForms	List<ClaimForm>	Claim Forms of The Department
	departmentName	String	Department Name
	manager	User	Manager of The Department
	officeAddress	String	Office Address of The Department
	operationArea	OperationArea	Operation Area of The Department
	region	Region	Region of The Department
	telephoneNumber	String	Telephone Number
	users	List<User>	Users of The Department

4.5 FormStatus

Class Name	FormStatus		
Type	POJO		
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model		
Attribute	id	Long	ID of Form Status
	formStatus	String	Form Status
	claimForms	Set	Claim Forms

4.6 OperationArea

Class Name	OperationArea		
Type	POJO		
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model		
Attribute	id	Long	ID of Operation Area
	areaName	String	Area Name
	isFinancial	String	If is Financial
	depts	Set	Departments

4.7 Region

Class Name	Region		
Type	POJO		
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model		
Attribute	id	Long	ID of Region
	regionName	String	Region Name
	depts	Set	Departments

4.8 User

Class Name	User		
Type	POJO		
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.model		
Attribute	id	Long	ID of User
	birthDate	String	Birth Date
	department	Department	Department
	emailAddr	String	Email Address
	firstName	String	First Name
	gender	String	Gender
	isAdmin	String	If is Admin
	isApprover	Boolean	If is Approver
	isFinancial	Boolean	If is Financial
	lastName	String	Last Name
	password	String	Password
	userName	String	User Name

5. Detail Design (Data Access Object Class)

About more detail and completed class information, you can refer to this application's Java Doc.

5.1 ClaimFormDao and ClaimFormDaoBean

Class Name	ClaimFormDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<ClaimForm>	Get POJO Class for Claim Form

5.2 ClaimFormItemDao and ClaimFormItemDaoBean

Class Name	ClaimFormItemDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<ClaimFormItem>	Get POJO Class for Claim Form Item

5.3 ClaimTypeDao and ClaimTypeDaoBean

Class Name	ClaimTypeDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<ClaimType >	Get POJO Class for Claim Type

5.4 Department Dao and Department DaoBean

Class Name	DepartmentDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class< Department >	Get POJO Class for Department

5.5 FormStatusDao and FormStatusDaoBean

Class Name	FormStatusDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<FormStatus>	Get POJO Class for Form Status

5.6 OperationAreaDao and OperationAreaDaoBean

Class Name	OperationAreaDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<OperationArea>	Get POJO Class for Operation Area

5.7 RegionDao and RegionDaoBean

Class Name	RegionDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<Region>	Get POJO Class for Region

5.8 UserDao and UserDaoBean

Class Name	UserDaoBean	
Type	Dao	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.dao.impl	
Method	getEntityClass() :Class<User>	Get Entity Class for User

6. Detail Design (Façade Java Bean Class)

About more detail and completed class information, you can refer to this application's Java Doc.

6.1 ClaimFormFacade & ClaimFormFacadeBean

Class Name	ClaimFormFacadeBean	
Type	Facade Java Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	claimFormDao : ClaimFormDao	
Method	approveFormByDepartment (ClaimForm) : void	Approve Form By Department
	approveFormByFinancial (ClaimForm) :void	Approve Form By Financial
	getClaimFormByUser(User) List<Department>	Get Claim Form By User
	getClaimFormsApprovedWiItems (User) : void	Get Claim Forms Approved With Items
	getClaimFormsForChart (User, List<String>, Map<String, List<BigDecimal>>) : void	Get Claim Forms For Chart
	getClaimFormsForYourApproval(User) : List<ClaimForm>	Get Claim Forms For Your Approval
	getClaimFormsPendingForApproval(User) :List<ClaimForm>	Get Claim Forms Pending For Approval
	getDao() : ClaimFormDao	Get Dao
	getTypesOfClaimFormByUser(User) : Map<Long, List<ClaimForm>>	Get Types Of Claim Form By User
	reject(ClaimForm claimForm)	Reject Claim Form
	resetFromRejectStatus (ClaimForm claimForm) : void	Reset From Reject Status
	submitForm(ClaimForm claimForm) :void	Submit Form
	updateTotal(ClaimForm claimForm) :void	Update Total Amount

6.2 ClaimFormItemFacade & ClaimFormItemFacadeBean

Class Name	ClaimFormItemFacadeBean	
Type	Facade Java Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	claimFormItemDao : ClaimFormItemDao	
Method	createAndUpdateTotal(ClaimFormItem) :void	Create And Update Total Claim Form Item
	deleteAndUpdateTotal(Long) :void	Delete And Update Total Claim Form Item
	getAllItemsByFormId(Long) : List<ClaimFormItem>	Get All Items By Form Id
	getDao() : ClaimFormItemDao	Get Dao
	updateAndUpdateTotal(ClaimFormItem) :void	Update And Update Total Claim Form Item

6.3 ClaimTypeFacade & ClaimTypeFacadeBean

Class Name	ClaimType FacadeBean	
Type	Facade Java Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	claimTypeDao : ClaimTypeDao	
Method	getDao() : ClaimTypeDao	Get Dao

6.4 DepartmentFacade & DepartmentFacadeBean

Class Name	DepartmentFacadeBean	
Type	Facade Java Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	departmentDao : DepartmentDao	
Method	deleteDepartmentWithUsers(Long) :void	Delete Department With Users
	getAllFinancialDepartments() :List<Department>	Get All Financial Departments
	getCurrentDepartmentManager(User) : User	Get Current Department Manager
	getDao() : DepartmentDao	Get Dao
	getDepartmentByName(String) : Department	Get Department By Name

6.5 FormStatusFacade & FormStatusFacadeBean

Class Name	FormStatusFacadeBean	
Type	Facade Java Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	formStatusDao : FormStatusDao	
Method	getDao() : FormStatusDao	Get Dao

6.6 OperationAreaFacade & OperationAreaFacadeBean

Class Name	OperationAreaFacadeBean	
Type	Session Facade Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	operationAreaDao : OperationAreaDao	
Method	getDao() : OperationAreaDao	Get Dao

6.7 RegionFacade & RegionFacadeBean

Class Name	RegionFacadeBean	
Type	Session Facade Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	regionDao : RegionDao	
Method	getDao() : RegionDao	Get Dao

6.8 UserFacade & UserFacadeBean

Class Name	UserFacadeBean	
Type	Session Facade Bean	
Package	sg.edu.ntu.wkw.msc.is.ead._2014.tera.v2.app.facade.impl	
Attribute	userDao : UserDao	
Method	createUserWithPassword(User) : User	Create User With Password
	getDao() : UserDao	Get Dao
	getRandomPassword() : String	Get Random Password
	getUnAssignUsers() : List<User>	Get Un Assign Users
	getUserByName(String) : User	Get User By Name
	getUsersByDepartment(Long) : List<User>	Get Users By Department
	signin(User) : User	Sign in User
	varifyUser(User) : User	Verify User

7. Action

Servlet Name	Functionality
ClaimFormRoot	Root contains all attributes from front end for Claim Form module
ClaimFormAction	Action is a controller to handle all web action for Claim Form module
DepartmentSRoot	Root contains all attributes from front end for Department module
DepartmentSAction	Action is controller to handle all web action for Department module
UserRoot	Root contains all attributes from front end for User module
UserAction	Action is controller to handle all web action for User module

8. JSP

JSP File	Functionality
claimForm	
create.jsp	Page to add a new claim form
createItem.jsp	Page to add a new claim form item
edit.jsp	Page to edit a claim form
editItem.jsp	Page to edit a claim form item
list.jsp	Page to list all claim forms
monitor.jsp	Page to monitor claim forms
view.jsp	Page to view a claim form
viewItem.jsp	Page to view a claim form item
common	
ajax_result.jsp	Contain the ajax result of the jsp
chart.jsp	Contain the chart of the jsp
foot_copyright.jsp	Contain the footer copyright of the jsp
foot_scipt.jsp	Contain the footer script of the jsp
head.jsp	Contain the header of the jsp
menu.jsp	Contain the menu of the jsp
message.jsp	Contain the message of the jsp
navigation.jsp	Contain the navigation of the jsp
department	
create.jsp	Page to add a new department
edit.jsp	Page to edit a department
list.jsp	Page to list all departments
view.jsp	Page to view a department
error	
not_found_error.jsp	Page to redirect when meet not found error
unknown_error.jsp	Page to redirect when meet unknown error
report	
edit1.jsp	Page to edit a report 1
edit2.jsp	Page to edit a report 2
list.jsp	Page to list all reports
user	
create.jsp	Page to add a new user
edit.jsp	Page to edit a user
editPassword.jsp	Page to edit user password
list.jsp	Page to list all users
signin.jsp	Page to sign in a user
signout.jsp	Page after sign out a user
view.jsp	Page to view a user
viewDashboard.jsp	Page to view dashboard