



# POLITECNICO MILANO 1863

## POWER ENJOY

### Inspection Document

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# 1 Functional Role

## 1.1 Class Under Inspection

The code inspection activity described in the following of this document takes as subject the **HumanResEvent.java** class, a java compilation unit belonging to the **Human Resource** application, part of the OFBIZ open-source project.

The namespace of reference for this class is the *org/apache/ofbiz/humanres*.

## 1.2 Functional Role

The analysis of functional role covered by the java class under inspection would be quite superficial and with more arising questions than answers if a worthwhile overview of the most important elements of the project would not be taken in consideration.

Thus, before meeting the goal of this section, a glance to the relevant concept for our analysis is given.

### 1.2.1 OFBIZ overview

The Open For Business project is an enterprise-oriented suite of applications developed to support most of the aspects that an enterprise application has to take care of.

The applications share the same underlying architecture, using common data, logic and process components.

A loosely coupled approach is used as base for the architecture, allowing an easy extension of the suite itself.

Each application is loosely coupled with the others, easing the updating and the extension.

### 1.2.2 Entities and Services

As stated by the official documentation:

- **Entities:** an entity is a relational data construct that contains any number of Fields and can be related to other entities. Basic entities correspond to actual database structures.
- **Services:** a service is a simple process that performs a specific operation.

### 1.2.3 Project's architecture

The architecture of the entire suite is composed by 4 sets of components:

- **Framework**
- **Applications**
- **Special Purpose**
- **Hot-deploy**

The sets of components, as well the contained components, are in a dependency relationship according to the dependency-arcs shown in the following diagram.

The dependency flow goes from top to bottom, either for component sets and for components.

This means that components and applications on the top are dependent on elements on the bottom of the same diagram. The viceversa should not be allowed.

The type of dependency may vary: foreign key dependency in the data model, application's service calling another application's service and so forth.

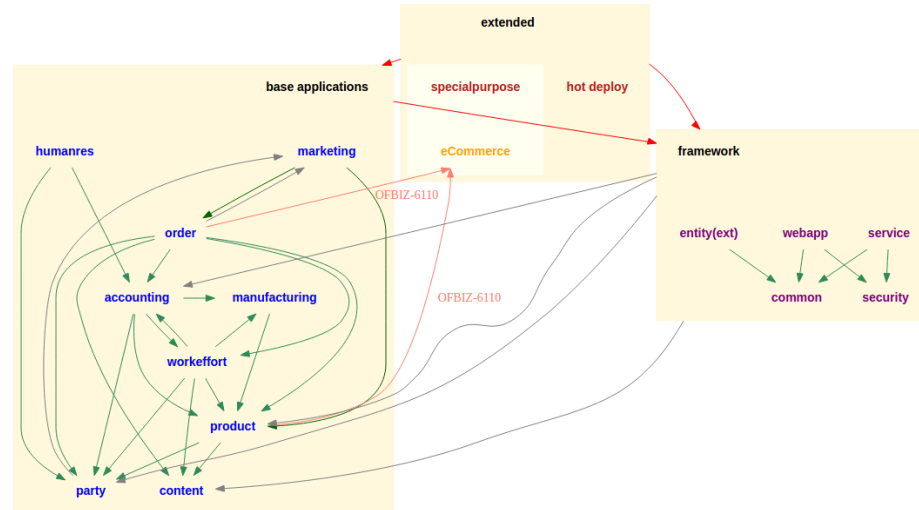


Figure 1: Components dependencies

As can be seen, there's a relation of dependency between the human resource application and the party application.

#### 1.2.4 Parties

According to the *OFBIZ project's overview*<sup>1</sup>:

*Party can be either a Person, or a group of Parties. A Party Group could be a company, an organization within the company, a supplier, a customer, and so forth. Information that describes Parties or is directly related to Parties is contained in these entities.*

According to the party's data model, each party, either a person, a group and so forth, is identified by a unique ID number.

#### 1.2.5 Human Resource Entities

According to the *OFBIZ project overview*:

*The Human Resources entities are used to keep track of positions, responsibilities, skills, employment, termination, benefits, training, pay grades and payroll preferences, performance reviews, resumes and applications, and other Human Resources related information.*

#### 1.2.6 Internal Organization

Quoting the *human resource glossary*<sup>2</sup>:

*Internal organization is the name of a relationship between a party group and your company.*

*This relationship is used to filter party groups as being part of your company to distinguish them from other groups which are external.*

*For example your marketing department is an internal organization while a suppliers sales department is not.*

#### 1.2.7 Employee Position

Also abbreviated as *position*, it is an entity used to represent a work position inside the company. Quoting the *official documentation of the project*<sup>3</sup>:

*In OFBiz a position is the authorization, typically from the budget of an internal organization, for the Company to engage one person to do a job. OFBiz handles positions in a flexible manner so you can think of a position as an authorization for a full-time equivalent (FTE).*

---

<sup>1</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Component+and+Component+Set+Dependencies>

<sup>2</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Human+Resources+Glossary>

<sup>3</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Employee+Position>

This means that you can fulfill a position with a person in a number of different ways. You can fill a position with one full time person, change the assignment of a position from one person to another over time, or split a position across more than one person at the same a time.

As implemented a position can be fulfilled by **either a person or organization**.

The data model<sup>4</sup> representing a employee position is quite huge and complex, so only the essential part for our analysis are shown and described.

**NB:** The whole data model diagram on the wiki is not up to date, therefore there could be some discrepancy between it and the documentation.

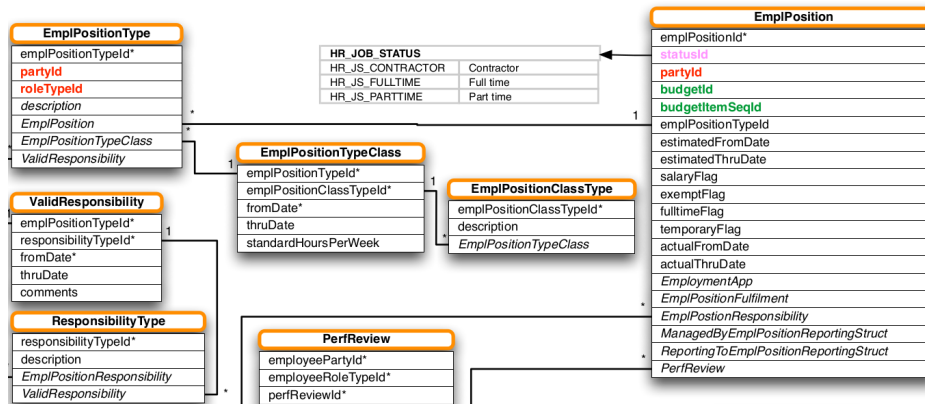


Figure 2: Employment Position - Employment Position Type relationship

- **EmplPosition**: entity used to represent an employee position inside the Human Resource Application.

Each entity is characterized by several. The most relevant for our analysis are:

- **emplPositionId**: an **unique** identifier used to distinguish a position from another one.
- **statusId**: a string identifying the status of the position.

Actually, the documentation and the data model of the emplPosition entity diverge about the content of this field.

The former specifies that it is used to state if the position is **Active/Open**, **Inactive/Closed** or **Planned for**, while the data model diagram report is as a field specifying the type of position: **full time**, **part time** or **contractor**.

<sup>4</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Data+Model+Diagrams>

As stated previously, the data model is not updated, therefore we take as reference what described by the documentation.

- **partyId:** the ID of the **Internal Organization** authorized to fill the position.
- **EmplPositionType:** entity representing a possible type for a position. An example of position type is the Business Analyst or the System Administrator. Relevant fields are:
  - **emplPositionTypeId:** unique identifier used to discern between position types.
  - **partyId:**
  - **description:** a description of the type of position.
  - **EmplPosition:** identifier of the employee position having this specific type.

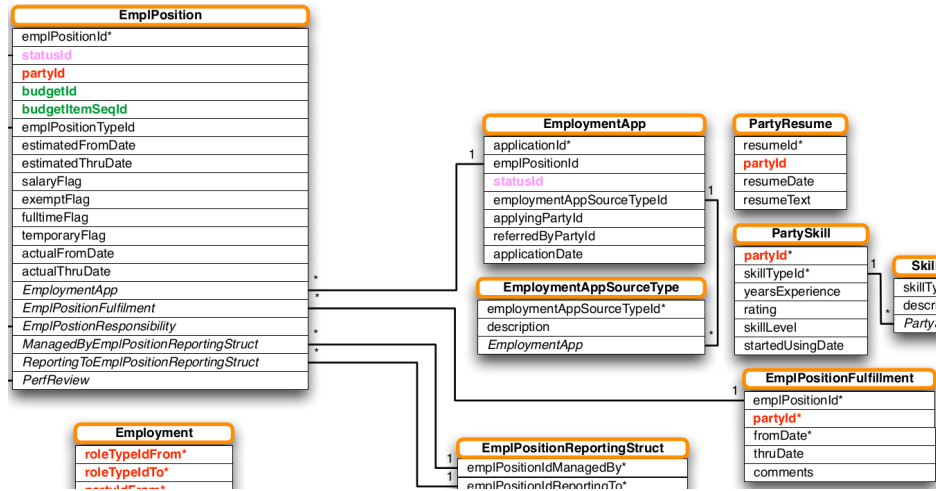


Figure 3: Employee Position - Employee Position Fulfillment relationship

- **EmplPositionFulfillment:** entity used to represent the party or parties that fulfill a specific position. Relevant informations of this entity are:
  - **emplPositionId:** the ID of the position fulfilled by the party.
  - **PartyId:** the ID of the party fulfilling the position.
  - **fromDate:** the date from which the position is fulfilled.

### 1.2.8 Human resource application

The human resource application comes with a predefined set of functionalities that can be used to perform HR tasks or to provide a support for the creation of more complex HR applications.<sup>5</sup>

According to the documentation of the human Resources application<sup>6</sup>:

*The Main window is the entry point into the Human Resources Application and displays the Company tree view for navigating to the main menu items.*

*There are three node types in the tree, each identified by a different icon. The top of the tree represents your Company, the highest level in the organization. The Company and departments under the Company can have sub departments or positions. Under positions are the people who fulfill the position.*

Furthermore, as stated by the documentation, from the main screen of the application is possible:

- Navigate the company hierarchy, viewing departements, position and people.
- Add or remove a department
- Add a person
- Quickly open the profile of any item in the tree
- If an item is a position, you can add a person to fulfill the position.

### 1.2.9 Tree and HumanResEvents class

In the previous paragraph the important role played by the tree has been discussed, showing how several important actions may be performed only through the tree itself.

This tree is created each time the main screen of the human resources application is visited. The generation is performed thanks to a jquery script named *create-Tree* and located in the *humanres/template/category/CategoryTree.ftl* template file. The script is executed each time the main screen is loaded, sending an asynchronous POST request to the resource located at *getHRChild*.

According to the *controller.xml* file, located in *webapp/humanres/WEB-INF* folder, the *getHRChild* resource is mapped to the only public method provided by the HumanResEvents class: **getChildHRCategoryTree**.

<sup>5</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Human+Resources+Guide>

<sup>6</sup><https://cwiki.apache.org/confluence/display/OFBIZ/Human+Resources+-+Main+Window>



In the light of this premise and the concepts introduced before, it's quite easy and straightforward to understand the role of this class: help in the construction of the company tree by

- Collecting the necessary informations of each party and position in the company.
- Using the collected informations to build the html attributes needed to enable the action performable through the tree (viewing departements, open profiles...).

The html attributes built for each party or position are returned in a **Map**, which structure follows the design of the json implementation of the tree, as stated by the comment on line 40.

As soon as the *getChildHRCategoryTree* is invoked, the informations gathering begins. The driver is the **partyId** identifier passed as a parameter to the class method.

Since a company or a department may have positions or child departments, the public method manages the retrieving of positions and child departments informations separately.

The gathering of positions informations is performed invoking the *getCurrentEmployeeDetails*, which queries the database about the presence of an employee position instance identified by the partyId identifier.

If positive, the computation goes on, verifying the presence of parties fulfilling that position. The check is made through a query against the *EmplPositionFulfillment*.

In presence of parties fulfilling that position, the following informations are collected:

- Name & Surname of the employee.
- Group name of the departments and companies.

For each party, html attributes necessary to show the informations and create links to their profile are built and stored inside map structure. After iterating over all the parties, the method ends and returns the list of map structures containing the informations of each party.

In both cases in which no employee position matches the partyId or no fulfillment is related to the position, the method ends returning an empty list.

**NB:** actually, the implementation of the *getCurrentEmployeeDetails* provides the retrieving of informations of only one employee position, since each *EmplPosition* entity is identified by a unique identifier.

The retrieving of child departments informations is handled by two different methods.

The first one, *getChildComps*, retrieves the informations concerning the children of the partyGroup: querying the *PartyRelationship* entity, it looks for parties that are in a father-child relationship with the partyGroup.

For each of the matching parties, the informations are retrieved and the html attributes built and stored in map structures, whichi are put in a list returned to the caller.

The informations are the same collected by the *getCurrentEmployeeDetails*.

The second method, *getEmployeeInComp*, queries the *EmplPosition* in order to find employee position currently active and authorized by the partyGroup. These informations are:

- **emplPositionId:** the employee position identifier.
- **description:** description of the position type.

As always, the required html attributes are built and stored in map structures, in turn placed into a list returned to the caller .

Maybe for an error, the comment preceding the invocation of this function in the public method states that it retrieves the informations of the employees working in the partyGroup, which is contrast with the behaviour of the method.

In the end, the *getChildHRCategoryTree* method returns to the jquery script the concatenation of lists of maps created retrieving informations about positions and child departments.

## 2 Checklist issues

### 2.1 Notation

During the code inspection of the class and the methods, some notations are used to ease the reporting:

- To make reference to a certain source line code, the **L.value** notation is used.

Example: **L.123** refers to line 123 of the class.

- To make reference to a block source lines code, the **L.val1-valN** notation is used.

Example: **L.123-456** refers to the block of source lines of code starting from line 123 and ending at line 456.

- To make reference to a specific issue of the check list, the **Cnumber** notation is used.

Example: **C42** refers to the 42th item of the checklist.

### 2.2 HumanResEvents Class

1. **C1** The class name does not suggest its purpose of supporting the creation of the category tree.
2. **C1** Class attributes `module` and `resourceError` does not respect the naming convention for class attributes.
3. **C1** The variables `jsonMap` declared at **L.126** and at **L.184** are probably misspelled and should be called `jsonMap`.
4. **C18** Any comment is used to explain the utility and purpose of the class.
5. **C23** Actually, the javadoc for this class is empty, making hard the task to understand the purpose of the class and of its methods.
6. **C27** The lines from **L.42** to **L.47** are identically repeated in other two methods (`getCurrentEmployeeDetails` & `getChildComps`). It would be a possible to create a proper method to handle this assignments, avoiding code duplication.
7. **C27** The lines from **L.126** to **L.129** are identically repeated in other two methods (`getChildComps` & `getEmployeeInCompo`). It would be a possible solution to create a proper method to handle this assignments, avoiding code duplication.

8. **C27** The lines **L.110-120** are repeated in another method ([getChildComps](#)). It would be a possible to create a proper method to handle this assignments, avoiding code duplication.
9. **C27** The lines **L.131-148** are repeated in other two methods ([getChildComps](#), [getEmployeeInComp](#)). It would be a possible solution to create a proper method to handle this assignments, avoiding code duplication.

## 2.3 [getChildHRCategoryTree](#) Method

1. **C10** Declaration of method [getChildHRCategoryTree](#) has an inconsistent bracing style. A space before the first brace is missing, unlike all the other opening blocks.
2. **C13** There are many lines that exceed the character limit: **L.41**, **L.57** and **L.68**
  - At **L.41** the signature of the method [getChildHRCategoryTree](#) can be split after the first parameter though it's not very readable.
  - At **L.57** the declaration of the variable [categoryList](#) exceeds the 80 character libit only by 4, it could be split after the `=` operator. Due to the fact that the character limit is exceeded only by 4 characters, this separation could be avoided to benefit readability.
  - At **L.68** the chain method invocation can be split before the [from\(\)](#) method is called.
3. **27** The [try-catch](#) blocks at **L.62** and at **L.77** have the same catch block, they could be merged into one.
4. **C33** The declaration of the variable `List<Map<String,Object>> categoryList` at **L.57** does not appear at the beginning of the block.
5. **C40** At **L.69** the object [partyGroup](#) is compared with `null` using the `!=` operator instead of the [isEmpty\(\)](#) helper function.
6. **C42** At **L.62** and **L.77** the [catch](#) blocks only provide the stack trace when catching an exception, not providing any guidance on how to correct the problem.
7. **C52** The [EntityQuery.queryOne\(\)](#) method invoked at **L.68** may throw an *IllegalArgumentException* when the list passed to the [EntityUtil.getOnly\(\)](#) method has more than one argument. None of the previously mentioned methods, nor the method under inspection, specify this expectation in a `try/catch` block.

## 2.4 `getCurrentEmployeeDetails` Method

1. **C1** The function's behaviour consists in gathering the informations of the employee or group parties fulfilling a given employee position. The function's name is quite misleading since it indicates the retrieving of the details about the employee whose `partyId` is passed to the method.
2. **C1** The `emplfillCtxs` variable has a name not clear and it does not suggest that the variable contains a list of fulfillment for a position.
3. **C1** The `emplfillCtx` variable has a name not clear and it does not suggest that the variable contains a fulfillment for a position.
4. **C1** The `memCtx` variable has a name not clear and it does not suggest that the variable contains a `GenericValue` object initialized with the information of a person fulfilling a certain position.
5. **C1** The `memGroupCtx` variable has a name not clear and it does not suggest that the variable contains a `GenericValue` object initialized with the information of a party group fulfilling a certain position.
6. **C13** The statements at line **L.102**, **L.108**, **L.121** and **L.131** exceed the length of 80 characters per line, while it's possible to break them on different lines.
7. **C14** The method's signature at **L.85** exceed the maximum legal length of 120 characters per line, while it's possible to break it before the `throws` keyword.
8. **C18** The method is not documented in anyway. Only with the documentation, not related to the code, found on the project's wiki is possible to understand the purpose, behaviour and attributes of the method.
9. **C18** The `if` and `for` blocks located at lines **L.100**, **L.105**, **L.106**, **L.110**, **L.122** and **L.134** are not commented.
10. **C33** `memGroupCtx` at **L.121**, map objects in the block **L.126-129** and `hrefStr` at **L.133** not declared at the beginning of `for` block at **L.106**.
11. **C42** The error message returned in the exception at **L.153** specify solely the stack trace, without providing any guidance on how to correct the problem.
12. **C52** The `EntityQuery.queryOne()` method invoked at **L.108** and **L.121** may throw an `IllegalArgumentException` when the list passed to the `EntityUtil.getOnly()` method has more than one argument. None of the previously mentioned methods, nor the method under inspection, specify this exception in a `try/catch` block.

## 2.5 `getEmployeeInComp` Method

1. **C1** The variable `catId` at **L.180** has a name that does not suggest that it contains the ID of the party in which is contained the node that we're inspecting.
2. **C1** The variable `catNameField` at **L.181** has a name that does not suggest that it contains the name of the *PartyGroup* related to the node we're inspecting.
3. **C1** The variable `childContext` at **L.192** has a name that does not suggest that it contains the information of the *PartyGroup* related to the node we're inspecting.
4. **C1** The variable `childOfSubComs` at **L.200** has a name that does not immediately suggest that it contains the list of child nodes related to the node we're inspecting.
5. **C1** The variable `isPosition` at **L.205** has a name that does not immediately suggest that is used to check if the node that we are inspecting has an employment position related to it.
6. **C1** The variable `emContext` at **L.211** has a name that does not immediately suggest that it contains the information of an employee related to the node we are inspecting, instead it could be named `employeeContext` to make things more clear.
7. **C10** Declaration of method `getChildComps` has an inconsistent bracing style. A space before the first brace is missing, unlike all the other opening blocks.
8. **C13** There are many lines that exceed the character limit: **L.160**, **L.168**, **L.169**, **L.184**, **L.186**, **L.192**, **L.200**, **L.205**, **L.206**, **L.211** and **L.224**
  - At **L.60** the signature of the method `getChildComps` can be split after the first parameter to strictly maintain the 80 character limit though it's not very readable. A better solution that maintain readability could be to split before the **throws** keyword and exceeding the limit by only 6 characters.
  - At **L.168** the declaration of the variable `partyGroup` exceeds the 80 character limit only by 8, it could be split after the `=` operator. Due to the fact that the character limit is exceeded only by a small amount, this separation could be avoided.
  - At **L.169** the declaration of the variable `resultList` exceeds the 80 character limit only by 3, it could be split after the `=` operator. Due to the fact that the character limit is exceeded only by a small amount, this separation could be avoided.

- At **L.184** the declaration of the variable `jsonMap` exceeds the 80 character limit only by 1, it could be split after the `=` operator. Due to the fact that the character limit is exceeded only by a small amount, this separation could be avoided.
  - At **L.186** the declaration of the variable `dataAttrMap` exceeds the 80 character limit only by 4, it could be split after the `=` operator. Due to the fact that the character limit is exceeded only by a small amount, this separation could be avoided.
  - At **L.192** the chain method invocation can be split before the `from()` method is called.
  - At **L.200** the line could be split after the `=` operator to follow the 80 characters limit, though losing some readability.
  - At **L.205** the chain method invocation can be split before the `from()` method is called.
  - At **L.206** the concatenated conditions could be split after the `||` operator.
  - At **L.211** the chain method invocation can be split before the `from()` method is called.
  - At **L.224** line could be split after the comma.
9. **C29** At **L.168** and **L.170**, the variables `partyGroup` `childOfComs` can be declared inside the following `try` block since it is the only place where the variables are used. Doing so we can directly initialize the variables with the proper value instead of `null`.
  10. **C29** At **L.181**, the variable `catNameField` can be declared inside the following `if` block since it is the only place where the variable is used. Doing so we can directly initialize the variable with the proper value instead of `null`.
  11. **C33** The declarations at **L.184-187**, **L.192**, **L.200**, **L.205**, **L.211** and **L.226** are not made at the beginning of the block.
  12. **C42** At **L.245** the `catch` block only provides the stack trace when catching an exception, not providing any guidance on how to correct the problem.
  13. **C52** The `EntityQuery.queryOne()` method invoked at **L.192** and **L.211** may throw an *IllegalArgumentException* when the list passed to the `EntityUtil.getOnly()` method has more than one argument. None of the previously mentioned methods, nor the method under inspection, specify this exception in a `try/catch` block.
  14. **53** The `catch` block at **L.245** generates a new exception of the same type of the one caught, without adding any information to it. A better solution

could be to throw the same exception caught, or to decorate the new exception with more informations.

## 2.6 `getEmployeeInComp` Method

1. **C1** The method's name is quite misleading since it does not suggest that the function returns informations about currently active employee positions authorized by the party group identified by the `partyId` passed as parameter.
2. **C1** `isEmpls` variable's name does not suggest to store the list of employee positions authorized by the party group.
3. **C1** `childOfEmpl` variable's name does not suggest to store the current employee position visited through the `for` cycle at **L.269**.
4. **C1** `emplpfCtxs` variable's name does not suggest to store the list of fulfillment for a certain employee position.
5. **C1** `emplContext` variable's name does not suggest to store a `GenericValue` object initialized with the informations concerning the `EmplPositionType` instance related to the employee position currently analyzed through the `for` cycle at **L.269**.
6. **C13** At **L.263**, the `EntityCondition.makeCondition()` method invocation exceeds the suggested maximum length of 80 characters per line. Possible to break after the first comma.
7. **C13** At **L.264**, the `EntityCondition.makeCondition()` method invocation exceeds the suggested maximum length of 80 characters per line. Possible to break after the first comma.
8. **C13** At **L.279**, the statement exceeds the suggested maximum length of 80 characters per line. Possible to break after the second chain operator.
9. **C13** At **L.289**, the statement exceeds the suggested maximum length of 80 characters per line. Possible to break after the second `+` operator.
10. **C13** At **L.294**, the statement exceeds the suggested maximum length of 80 characters per line. Possible to break after the second `+` operator.
11. **C14** The method signature at **L.254** exceeds the maximum legal length of 120 characters per line. Possible to break it before the `throws` keyword.
12. **C14** The statement at **L.286** exceeds the maximum legal length of 120 characters per line. Possible to break it after the second chain operator.

**NB:** applying this correction another **C14** issue is created at **L.287**, where the rest of the statement at **L.286** is placed. To solve it is possible to break after the first chain operator at **L.287**.



13. **C29** At **L.255**, the variable `isEmpls` can be declared inside the following `try` block since it is the only place where the variable is used. Doing so we can directly initialize the variable with the proper value instead of `null`.
14. **C33** Variables at **L.286-287** are not declared at the beginning of the `for` block at **L.269**.
15. **C52** The `EntityQuery.queryOne()` method invoked at **L.286** may throw an `IllegalArgumentException` when the list passed to the `EntityUtil.getOnly()` method has more than one argument. None of the previously mentioned methods, nor the method under inspection, specify this exception in a `try/catch` block.
16. **C52** `EntityCondition.makeCondition()` methods invoked at **L.263-264** may throw an `IllegalArgumentException` due to the `EntityExpr` constructor called by the `makeCondition` method itself. No `try/catch` block managed this exception and no `throws` is used to pass the exception to higher levels.
17. **C53** The `Debug.logError()` method does not log any useful information about the error. Indeed, the `logError` calls the `Debug.log()` method, which has a `"null"` value as message.

Then it calls another version of `Debug.log()`, which simply get a logger and stores the level danger of the error, the msg, which is `"null"` and the informations about the exception.

### 3 Other issues

We're not enirely sure about the following mistakes we found, the following list could be submitted to the writers of the code in order to better understand the behavior of the application and possibly fix it.

1. It possible the creation of a tree with nodes containing both infomations about a position and party group.

This bug may be triggered whenever the `getChildHRCategoryTree` method is invoked passing as one of the parameter of the **POST** request a `partyId` matching both an employee position with at least one employee fulfillment related to it and matching a party group.

When the `getCurrentEmployeeDetails()` method is invoked, it will end returning a list containing at least one map structure of a fulfillment related to the employee position.

Since the identificator matches a party group too, information about it are gathered. In the end, the main method will return a list with both informations about the position and the party group.

The main cause of this behaviour is the use of the same `partyId` to indentify both employee positions and party group, and in the data model there's no evidence about the uniqueness of primary keys between the PartyGroup entity and the EmplPosition entity.

2. At **L.194** there is a suspect block of code:

---

```
194: catNameField = (String)childContext.get("groupName");
195: title = catNameField;
196: josonMap.put("title", title);
```

---

Particularly the use of the variable `title` is unnecessary if we directly associate the key `"title"` to the value of the variable `catNameField`.

3. At **L.206** there's a suspect `if` statement:

---

```
206: if (UtilValidate.isEmpty(childOfSubComs) ||
207:      UtilValidate.isEmpty(isPosition)) {
208:     josonMap.put("state", "closed");
209: }
```

---

This piece of code sets the `"state"` attribute of a node to `"closed"` when either there is a child node or there is a employment position for the specified node.

Just by looking at this class we can assume that this is an incorrect implementation since is logic to think that a node is considered `"closed"` when it has no child and it doesn't have any employment position related to it.

## 4 Effort Spent

The effort spent by each member of the group in terms of hours is shown in the following:

Lorenzo Casalino

- 28 january 2017 - 55 min
- 29 january 2017 - 50 min
- 30 january 2017 - 2h
- 2 february 2017 - 1h 45min
- 4 february 2017 - 5h 30min
- 5 february 2017 - 8h 30min

Tommaso Castagna

- 03/02/17 - 30m
- 04/02/17 - 4h
- 05/02/17 - 4h30m
- 06/02/17 - 5h