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## Contents

# Message Broker Coding style

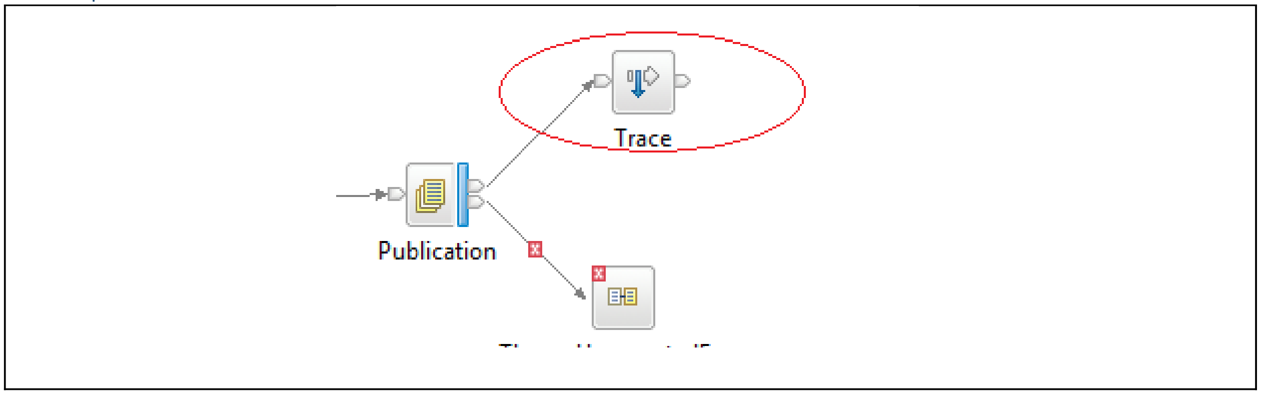
## Rule: Trace nodes should not be used

## Sonar Rule: R108

### Rational:

Trace nodes should not be used in production code.

### Example:



### Preferred:

NA

### References:

NA

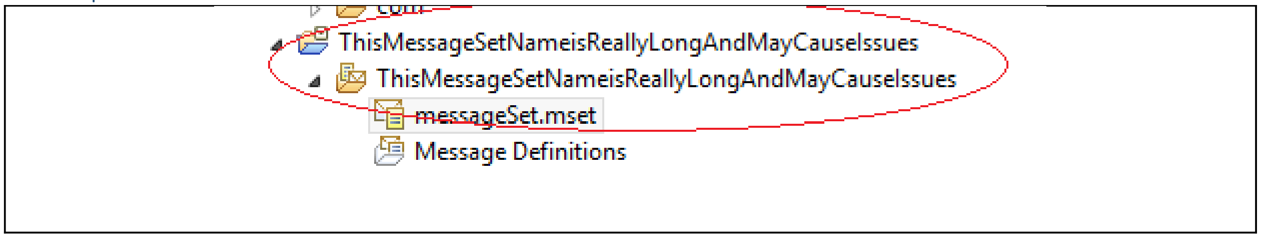
## Rule: MessageSet names should be less then 30 characters

## Sonar Rule: R136

### Rational:

MessgeSet names should be less then 30 characters.

### Example:


ThisMessageSetNameisReallyLongAndMayCauseIssues
ThisMessageSetNameisReallyLongAndMayCauseIssues
messageSet.mset
Message Definitions

### Preferred:

NA

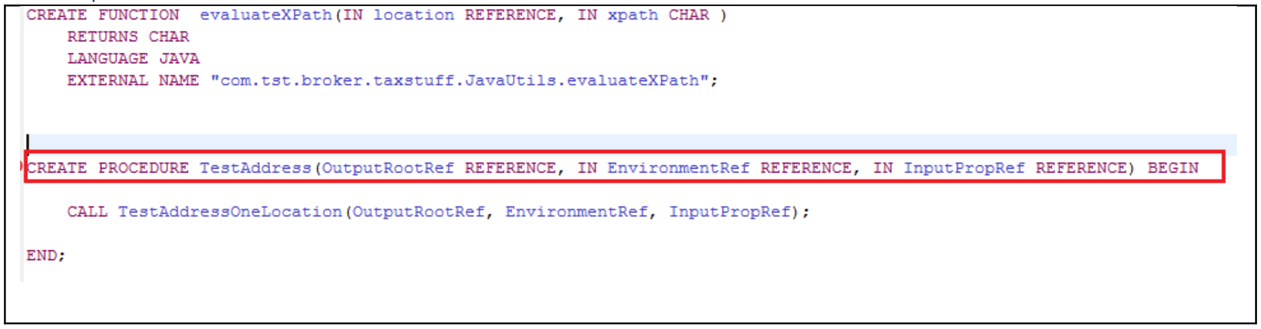
References:
NA

## Rule: Parameters should have a direction (IN, OUT, INOUT)

## Sonar Rule: R125

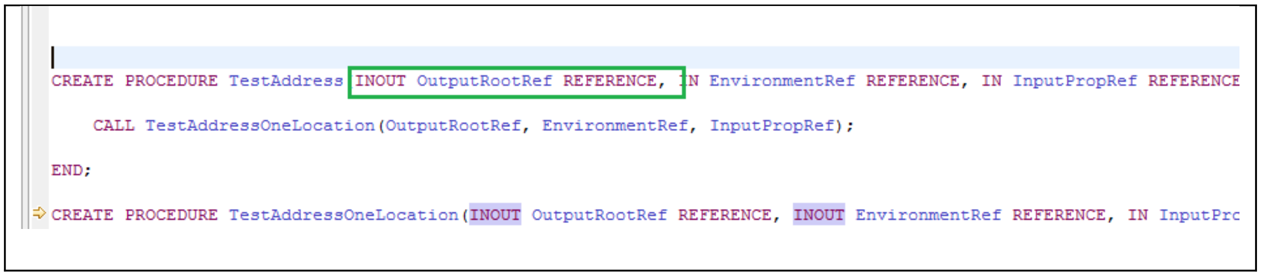
Rational:
Parameters should have a direction to improve readability and help understand intent.

Example:



```
CREATE FUNCTION  evaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";


CREATE PROCEDURE TestAddress(OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE, IN InputPropRef REFERENCE) BEGIN

    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:



```

CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE, IN InputPropRef REFERENCE

    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;

CREATE PROCEDURE TestAddressOneLocation(INOUT OutputRootRef REFERENCE, INOUT EnvironmentRef REFERENCE, IN InputPrc
```

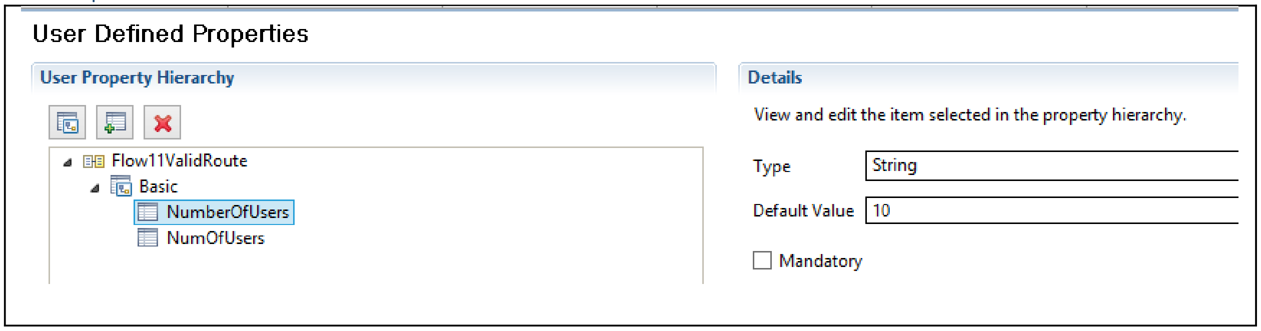
References:
NA

## Rule: The flow contains a duplicate UDP/property default value

## Sonar Rule: R90

Rational:
UDP's (user defined properties) in the same flow with the same value could be duplicates.

### Example:


User Defined Properties

User Property Hierarchy

- Flow11ValidRoute
  - Basic
    - NumberOfUsers
    - NumOfUsers

Details

View and edit the item selected in the property hierarchy.

Type: String

Default Value: 10

☐ Mandatory

### Preferred:
Check that UDP's with the same values are required.

### References:
NA

## Rule: It is good programming practice to give an EXTERNAL variable an initial value

### Sonar Rule: R61

### Rational:
By giving an EXTERNAL variable a default value it makes understanding the code easier and can simplify the default deployment process.

### Example:
```
DECLARE deployEnvironment EXTERNAL CHARACTER;
```

### Preferred:
```
DECLARE deployEnvironment EXTERNAL CHARACTER 'Dev';
```

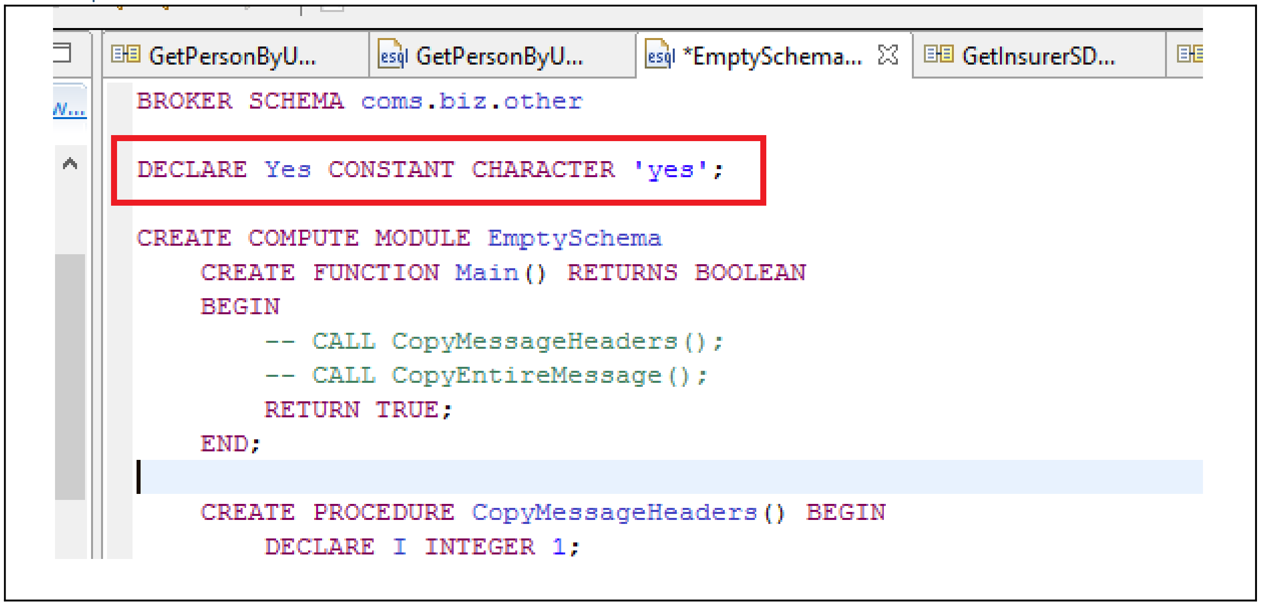
### References:
[http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/ak04980_.htm](http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/ak04980_.htm)

## Rule: ESQL constants should be in UPPERCASE

### Sonar Rule: R120

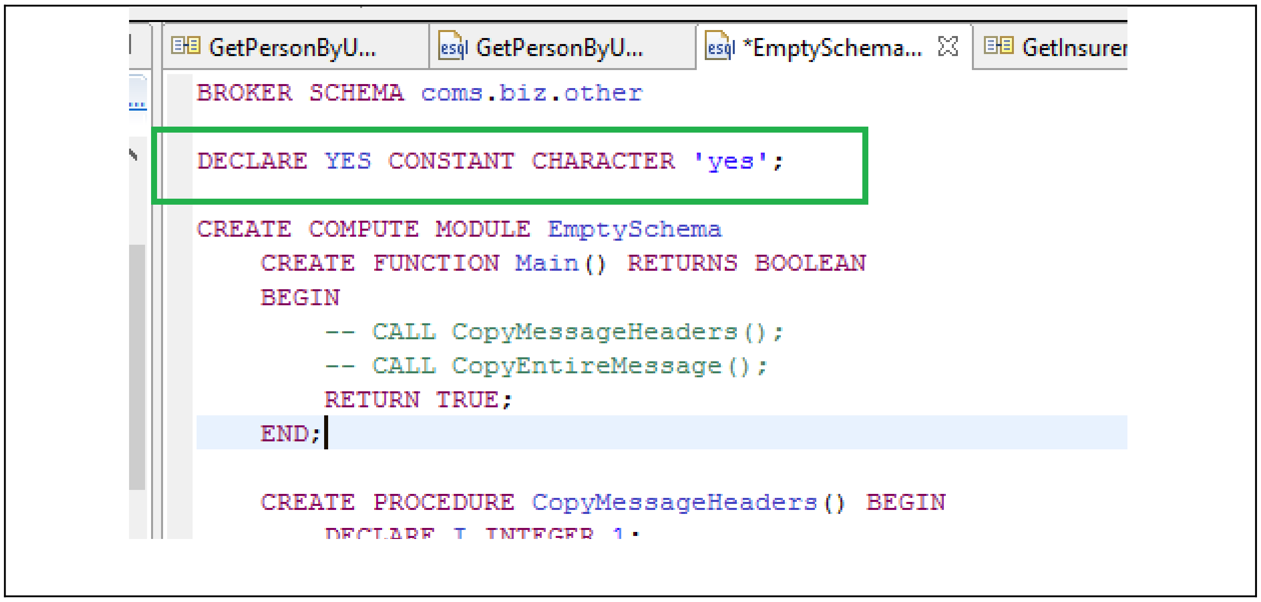
### Rational:
Writing constants in UPPERCASE makes it clearer to the user.

Example:



```
BROKER SCHEMA coms.biz.other

DECLARE Yes CONSTANT CHARACTER 'yes';

CREATE COMPUTE MODULE EmptySchema
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        -- CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
```

Preferred:



```
BROKER SCHEMA coms.biz.other

DECLARE YES CONSTANT CHARACTER 'yes';

CREATE COMPUTE MODULE EmptySchema
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        -- CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
```

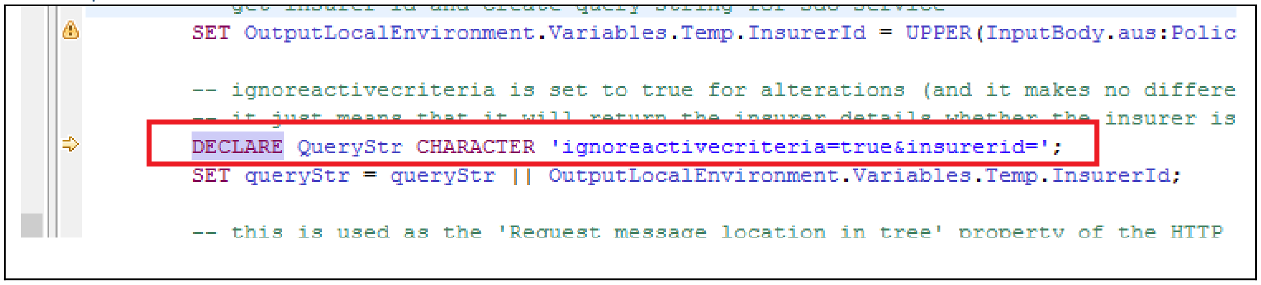
References:
NA

## Rule: ESQL variables should start with a lower case character

## Sonar Rule: R123

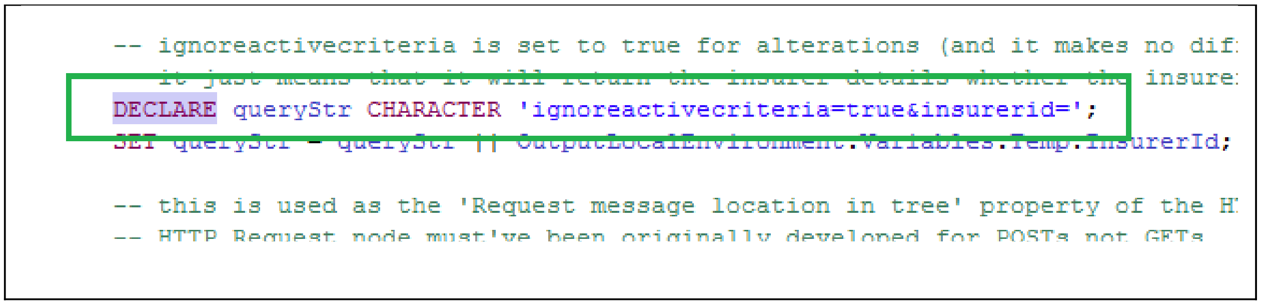
Rational:
Starting with a lower case character makes the code consistant and easier to read.

Example:



```
        SET OutputLocalEnvironment.Variables.Temp.InsurerId = UPPER(InputBody.aus:Polic

        -- ignoreactivecriteria is set to true for alterations (and it makes no differe
        -- it just means that it will return the insurer details whether the insurer is
        DECLARE QueryStr CHARACTER 'ignoreactivecriteria=true&insurerid=';
        SET queryStr = queryStr || OutputLocalEnvironment.Variables.Temp.InsurerId;

        -- this is used as the 'Request message location in tree' property of the HTTP
```

Preferred:



```
    -- ignoreactivecriteria is set to true for alterations (and it makes no dif
    -- it just means that it will return the insurer details whether the insure
    DECLARE queryStr CHARACTER 'ignoreactivecriteria=true&insurerid=';
    SET queryStr = queryStr || OutputLocalEnvironment.Variables.Temp.InsurerId;

    -- this is used as the 'Request message location in tree' property of the H
    -- HTTP Request node must've been originally developed for POSTs not GETs
```

References:

NA

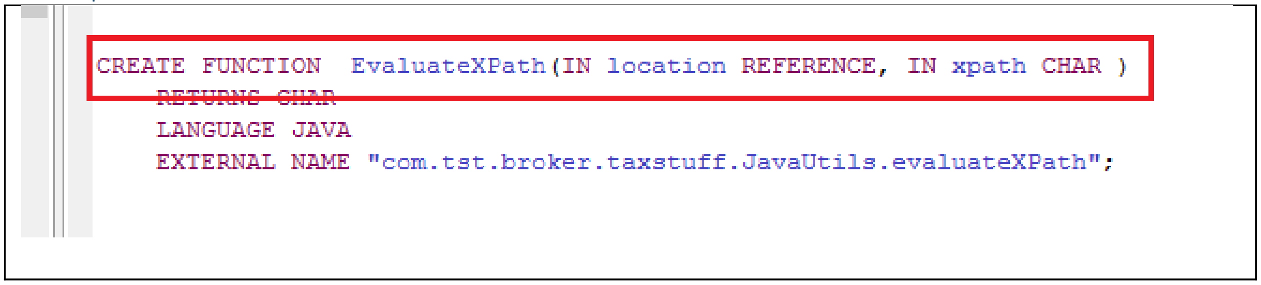
## Rule: ESQL procedure/function names should start with a lower case character

## Sonar Rule: R124

Rational:

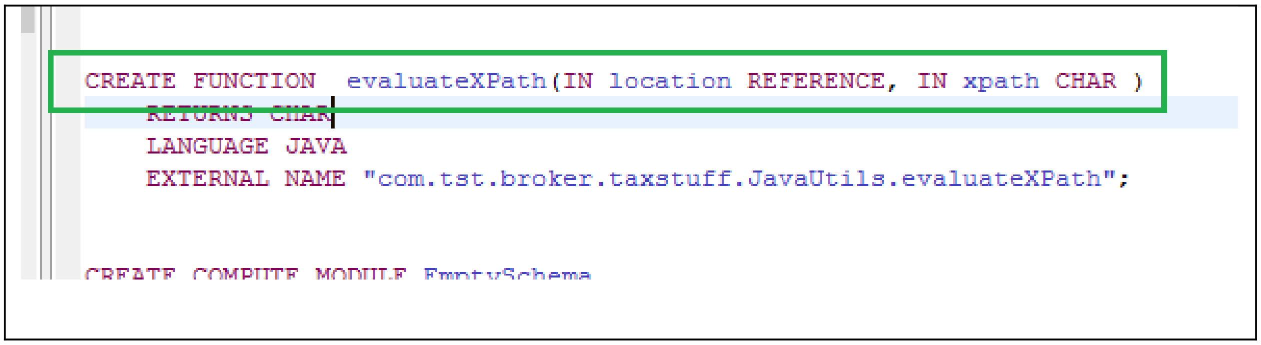
Starting with a lower case character makes the code consistant and easier to read.

Example:



```
CREATE FUNCTION  EvaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";
```

Preferred:



```
CREATE FUNCTION  evaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";


CREATE COMPUTE MODULE EmptySchema
```

References:

NA

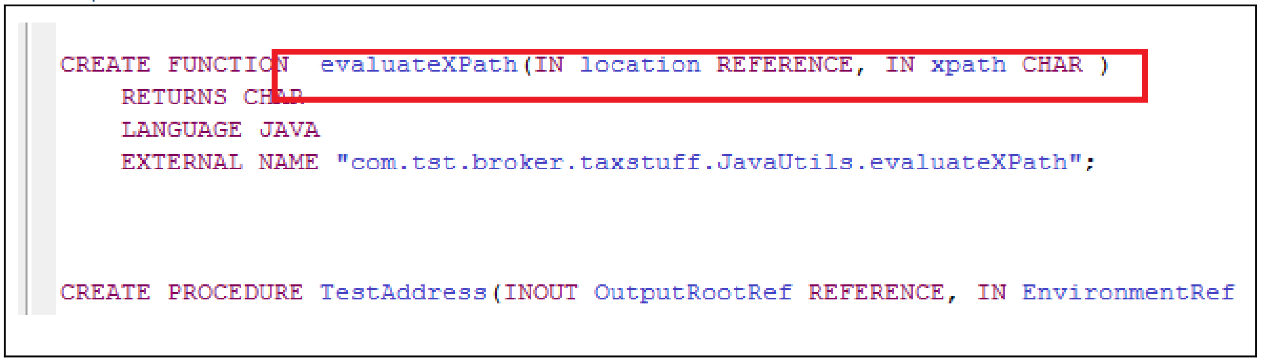
## Rule: ESQL procedure/function names should start with an upper case character

## Sonar Rule: R129

Rational:

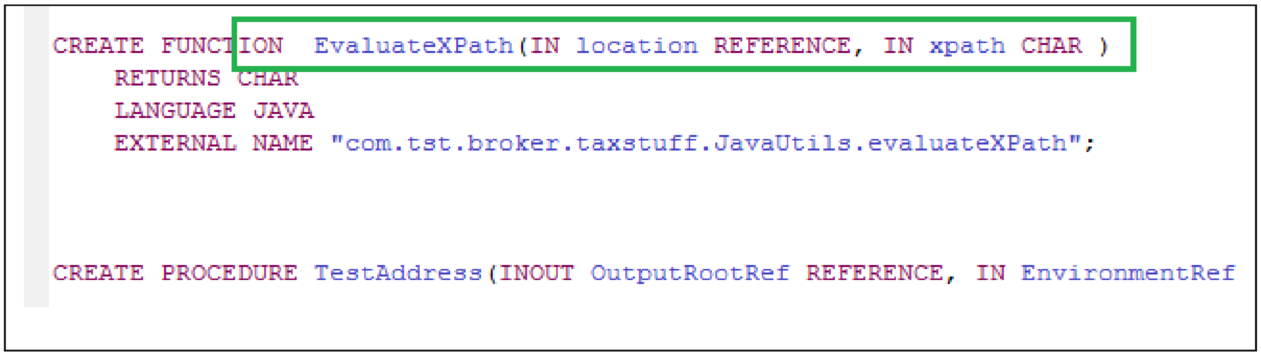
Starting with an upper case character makes the code consistant and easier to read.

Example:



```
CREATE FUNCTION  evaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";



CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef
```

Preferred:



```
CREATE FUNCTION  EvaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";



CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef
```

References:
NA

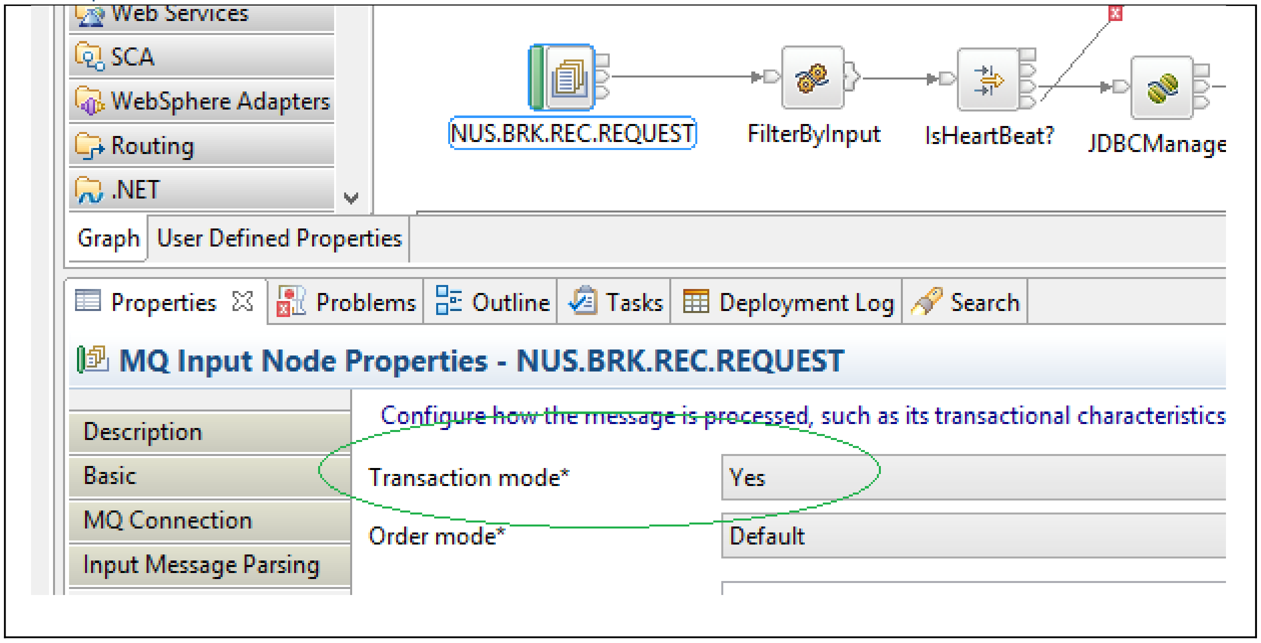
## Rule: MQ Input node transaction mode should be 'yes'

Sonar Rule: R130

Rational:

Running reading MQ messages under a sync point helps with maintaining DB consistancy.

Example:



MQ Input Node Properties - NUS.BRK.REC.REQUEST

Configure how the message is processed, such as its transactional characteristics

Transaction mode* Yes

Order mode* Default

Preferred:
NA

References:
NA

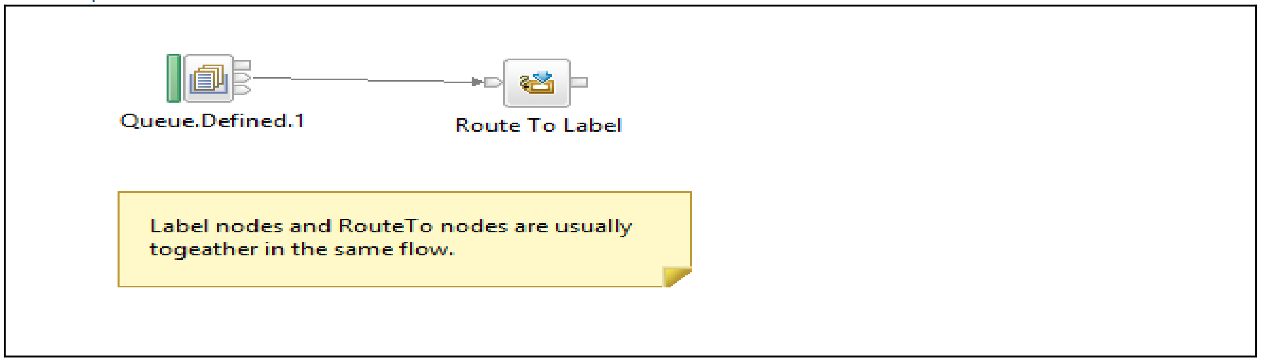
## Rule: Usually the RouteTo and Label are in the same flow as to make things more readable

Sonar Rule: R60

Rational:

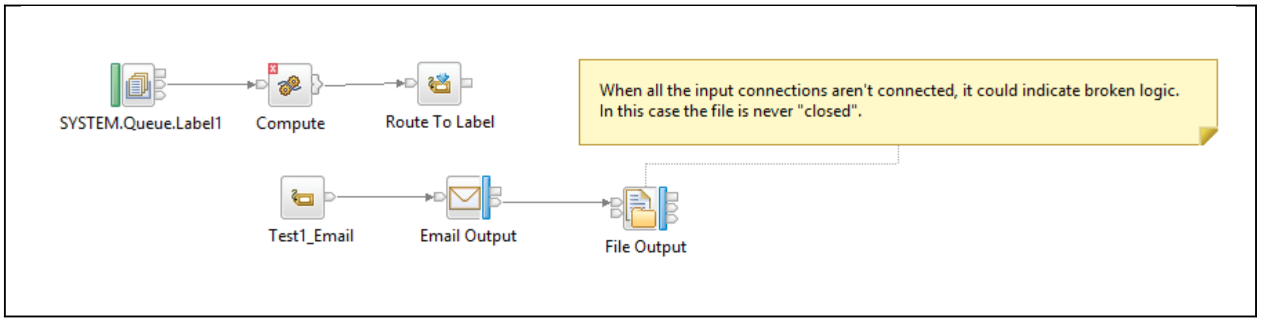
RouteTo and a Label nodes can be split across different flows, but they have to be in the same execution group and both running. Keeping them in the same flow makes the logic easier to understand.

Example:



Label nodes and RouteTo nodes are usually togeather in the same flow.

Preferred:



When all the input connections aren't connected, it could indicate broken logic. In this case the file is never "closed".

References:
NA

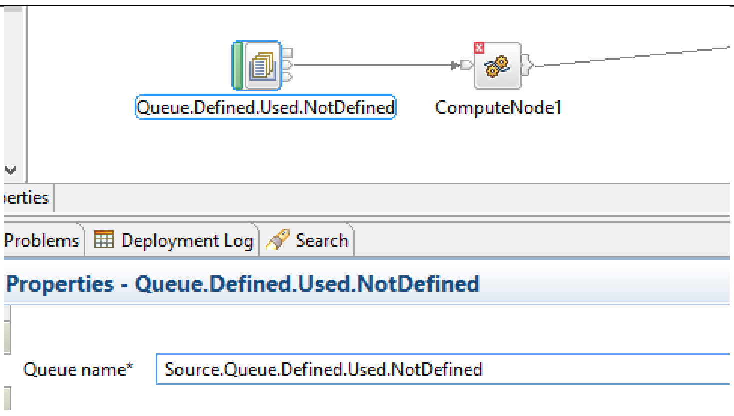
## Rule: MQNode name within the flow doesn't match the Queue name

## Sonar Rule: R32

### Rational:

By having the name of the Input/Output MQ nodes match to the queue that they reference it makes it easier to understand a flow within the context.

Example:



Properties - Queue.Defined.Used.NotDefined

Queue name* Source.Queue.Defined.Used.NotDefined

Preferred:

Change the node name to reflect the queue that it reads or writes to.

References:

NA

## Rule: Environment values should be under the Variables subtree

## Sonar Rule: R22

Rational:

Having environment values in a standard place helps orgainze the code.

Example:

```
SET Environment.MQMD = InputRoot.MQMD;
```

Preferred:

```
SET Environment.Variables.MQMD = InputRoot.MQMD;
```

References:

NA

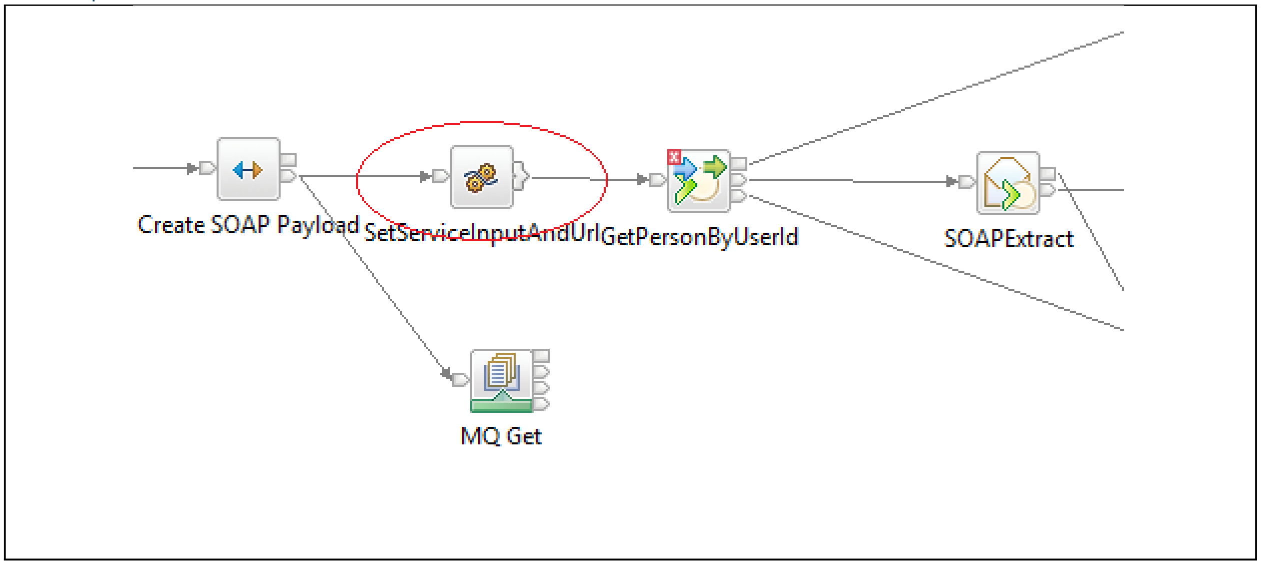
## Rule: Compute nodes should be avoided

## Sonar Rule: R102

### Rational:

Some organisation choose to use a Java node or mapping node centric implementation/coding standard.

### Example:



### Preferred:

NA

### References:

NA

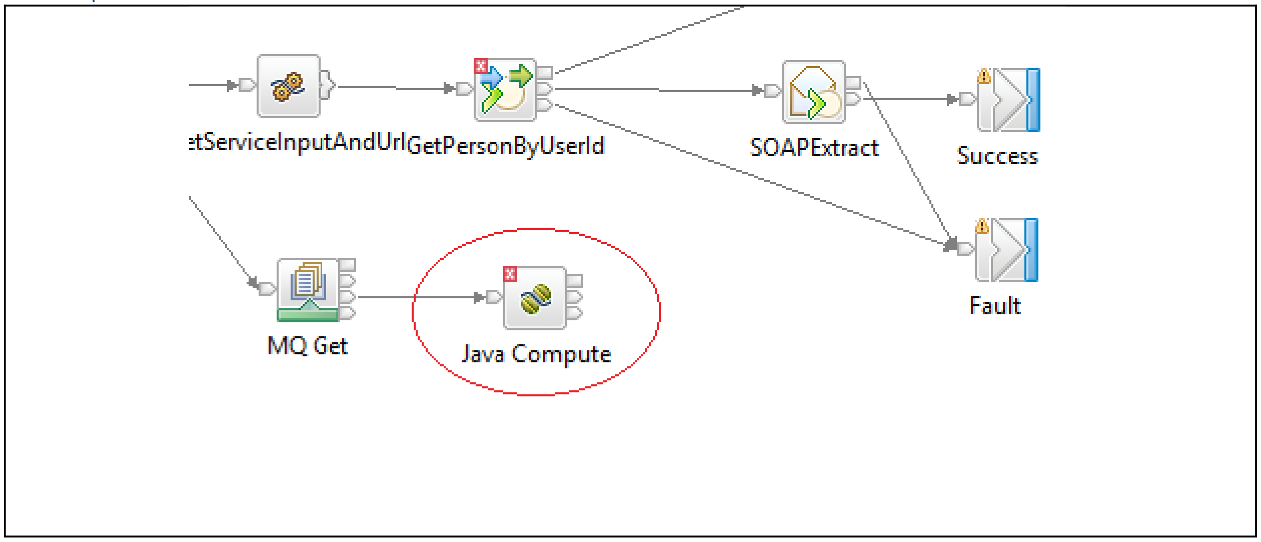
## Rule: Java nodes should be avoided

## Sonar Rule: R109

### Rational:

Some organisation choose to avoid Java nodes and use an ESQL or mapping node centric implementation/coding standard.

### Example:



### Preferred:

NA

### References:

NA

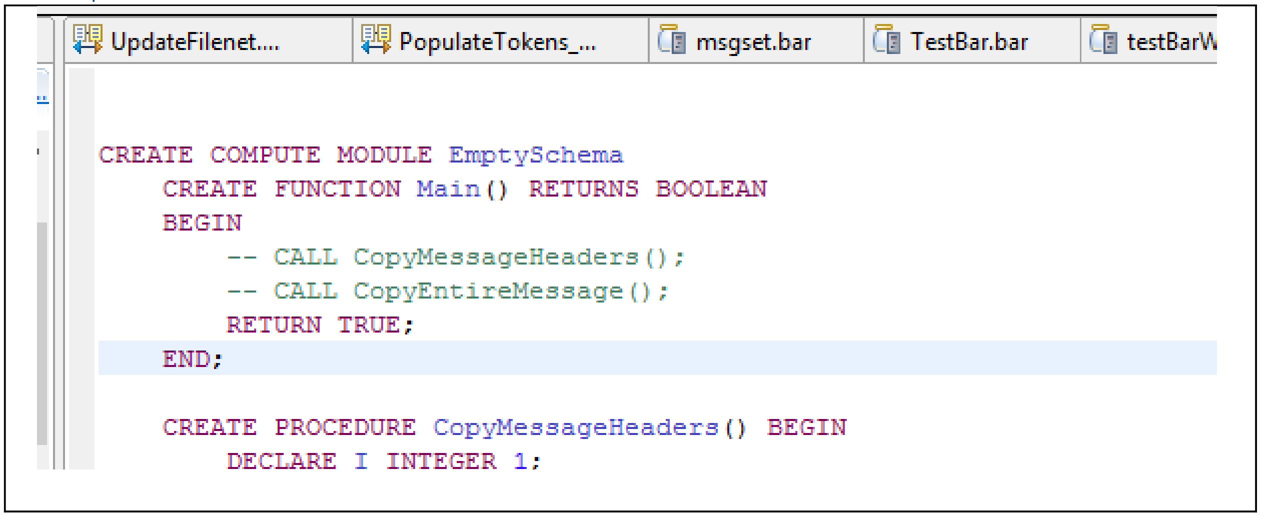
## Rule: Default broker schema should be avoided

## Sonar Rule: R103

### Rational:

ESQL/Msgflows should be organised into some structure. Usign the default SCHEMA is discouraged as it does not add an contextual meaning for those reading the code.

Example:



UpdateFilenet.... PopulateTokens_... msgset.bar TestBar.bar testBarW

```
CREATE COMPUTE MODULE EmptySchema
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        -- CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
```

Preferred:

Organise code into a structure that provides meaning/intent.

References:

NA

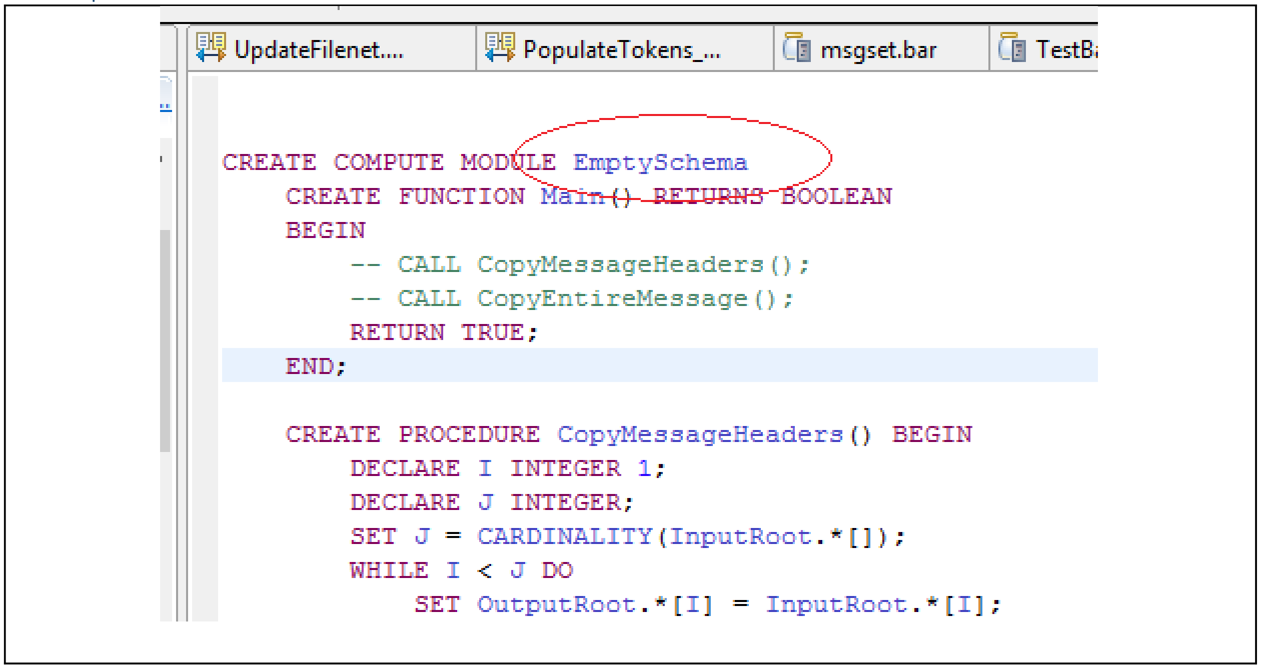
## Rule: Module Names should be in camelCase

## Sonar Rule: R104

Rational:

Modules name in ESQL should follow a “camelCase” naming standard.

Example:



```
CREATE COMPUTE MODULE EmptySchema
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        -- CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
        DECLARE J INTEGER;
        SET J = CARDINALITY(InputRoot.*[]);
        WHILE I < J DO
            SET OutputRoot.*[I] = InputRoot.*[I];
```

Preferred:

Rename module names to be “camelCase”.

References:

NA

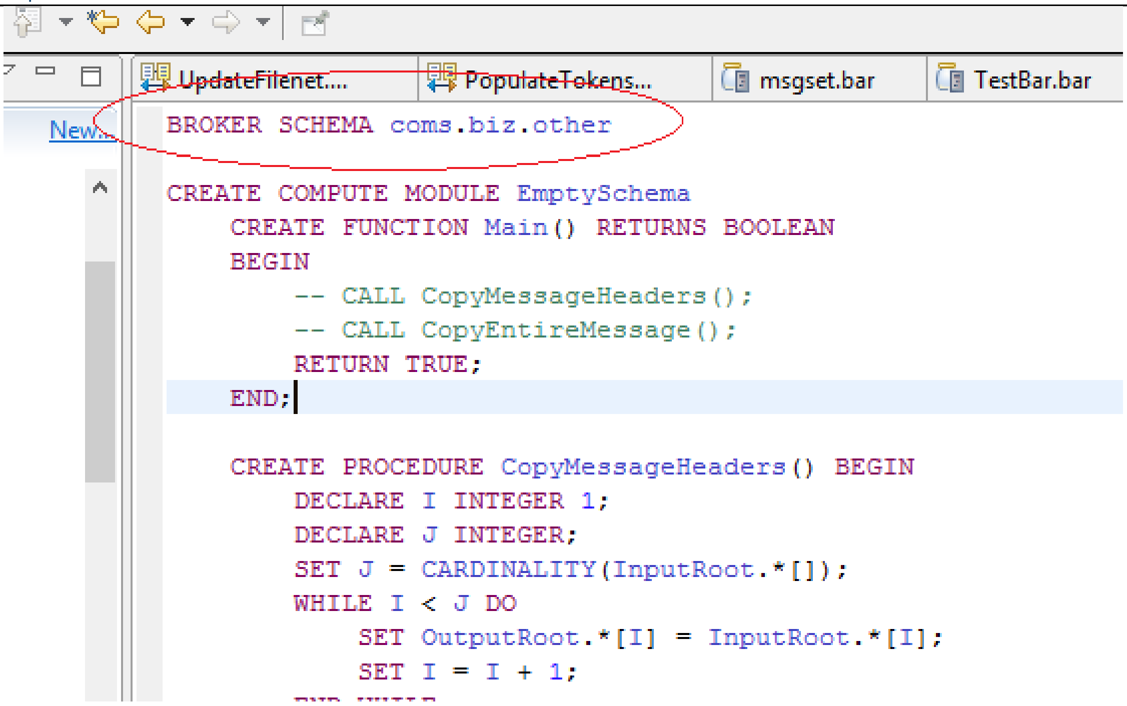
## Rule: Schema's should descend from parent defined in property file

## Sonar Rule: R105

Rational:

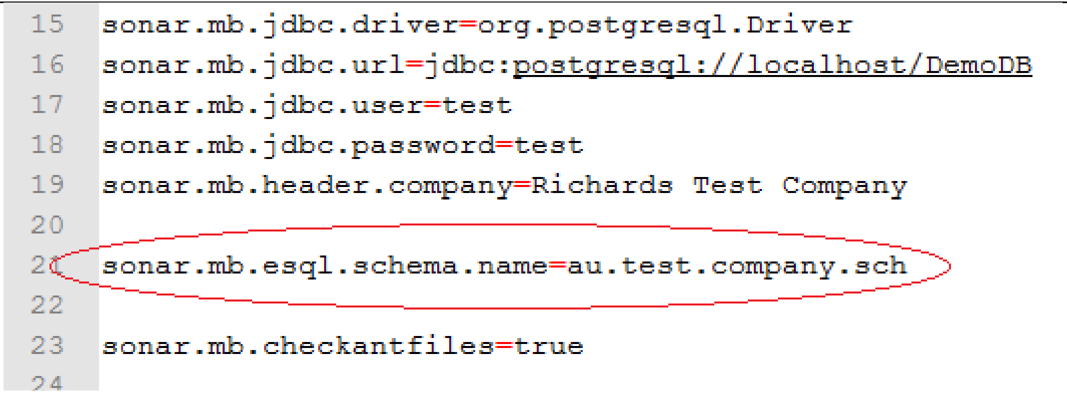
The SCHEMA's used should be based on the organisation as set in the property file.

Example:



UpdateFilenet.... PopulateTokens... msgset.bar TestBar.bar

```
BROKER SCHEMA coms.biz.other

CREATE COMPUTE MODULE EmptySchema
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        -- CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
        DECLARE J INTEGER;
        SET J = CARDINALITY(InputRoot.*[]);
        WHILE I < J DO
            SET OutputRoot.*[I] = InputRoot.*[I];
            SET I = I + 1;
```



```
sonar.mb.jdbc.driver=org.postgresql.Driver
sonar.mb.jdbc.url=jdbc:postgresql://localhost/DemoDB
sonar.mb.jdbc.user=test
sonar.mb.jdbc.password=test
sonar.mb.header.company=Richards Test Company

sonar.mb.esql.schema.name=au.test.company.sch

sonar.mb.checkantfiles=true
```

Preferred:
Update the SCHEMA in the ESQL and reorganise project folders.

References:
NA

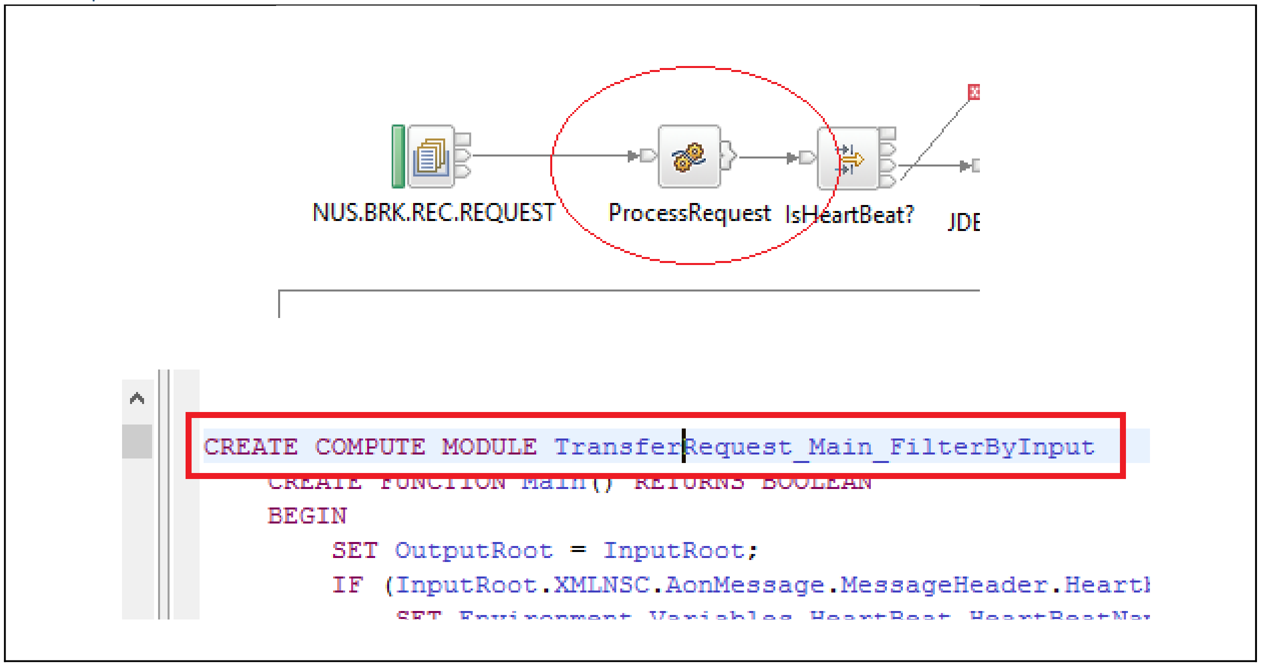
## Rule: Compute node name and ESQL don't match

### Sonar Rule: R132

### Rational:

The Compute Node name and ESQL should match.

### Example:



```
CREATE COMPUTE MODULE TransferRequest_Main_FilterByInput
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        SET OutputRoot = InputRoot;
        IF (InputRoot.XMLNSC.AonMessage.MessageHeader.Heart
            SET Environment.Variables.HeartBeat.HeartBeatNa
```

### Preferred:

Try to be consistant with refactoring the ESQL when renaming nodes.

### References:

NA

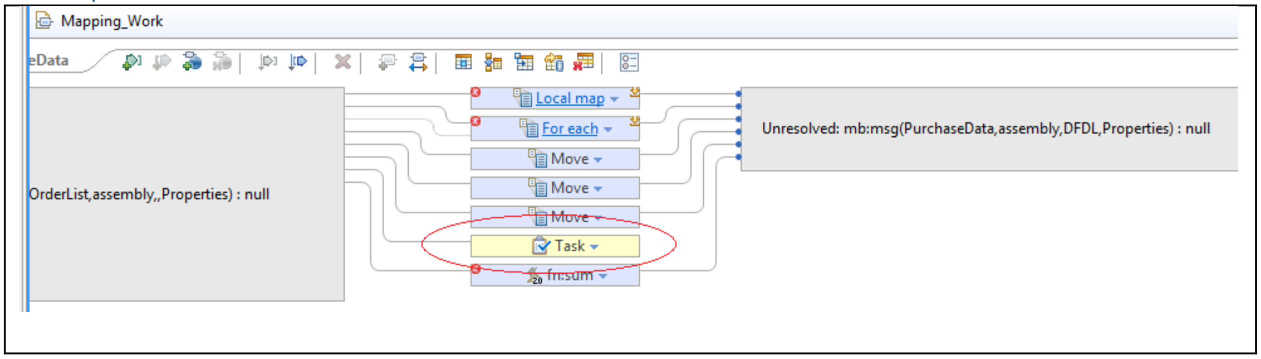
## Rule: TODO found in mapping node logic

### Sonar Rule: R167

### Rational:

TODO's usually indicated incomplete functionality.

Example:


Mapping_Work
eData
Local map
For each
Move
Move
Move
Task
fn:sum
OrderList,assembly,,Properties) : null
Unresolved: mb:msg(PurchaseData,assembly,DFDL,Properties) : null

Preferred:

Complete logic or remove TODO.

References:

NA

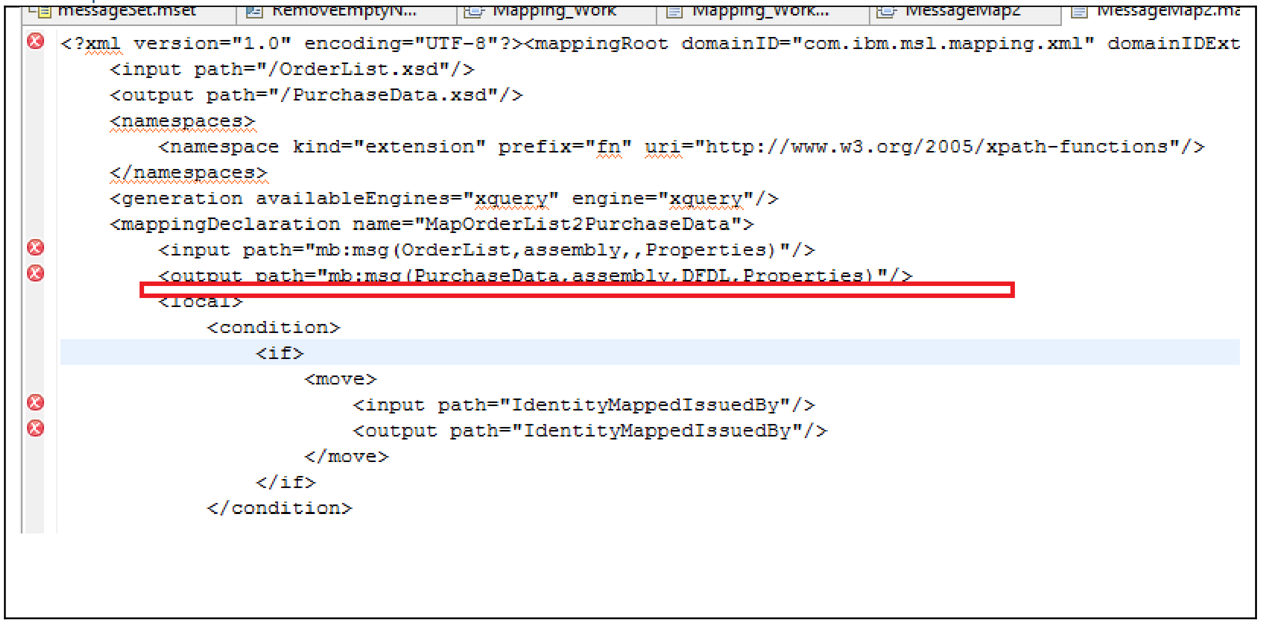
## Rule: Mapping node not copying properties

## Sonar Rule: R165

Rational:

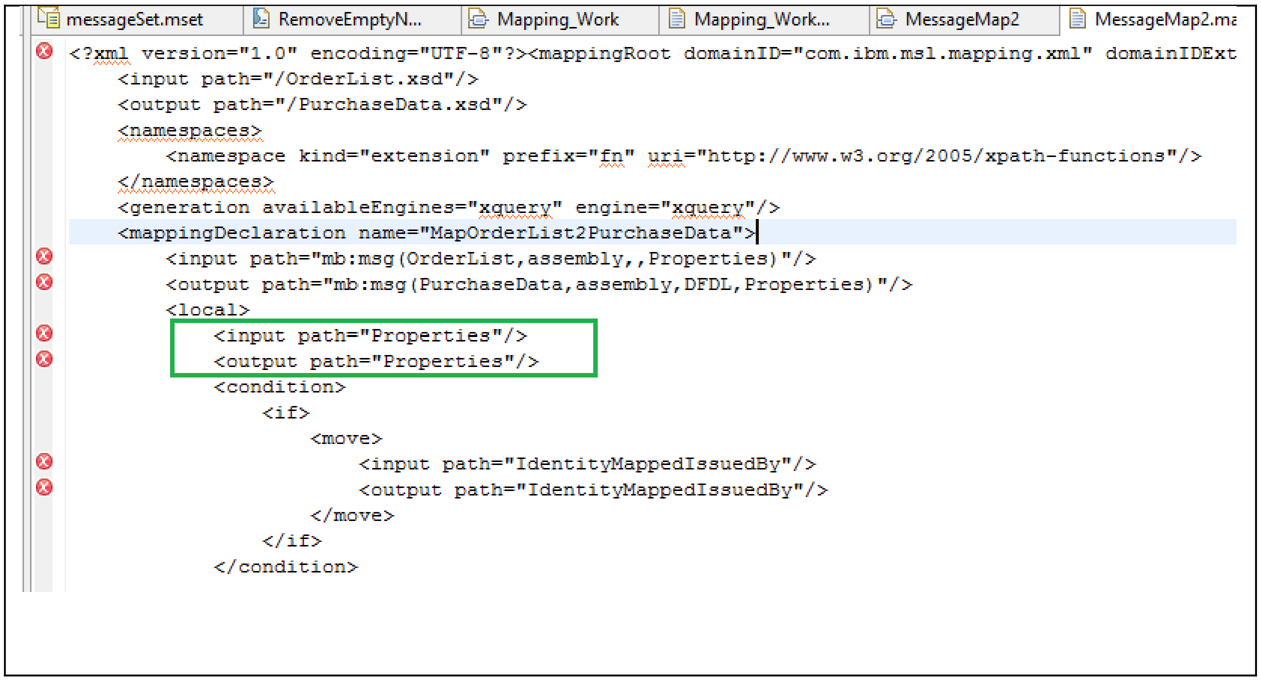
Properties are usually copied from the incoming message.

Example:



```
<?xml version="1.0" encoding="UTF-8"?><mappingRoot domainID="com.ibm.msl.mapping.xml" domainIDExt
    <input path="/OrderList.xsd"/>
    <output path="/PurchaseData.xsd"/>
    <namespaces>
        <namespace kind="extension" prefix="fn" uri="http://www.w3.org/2005/xpath-functions"/>
    </namespaces>
    <generation availableEngines="xquery" engine="xquery"/>
    <mappingDeclaration name="MapOrderList2PurchaseData">
        <input path="mb:msg(OrderList,assembly,,Properties)"/>
        <output path="mb:msg(PurchaseData,assembly,DFDL,Properties)"/>
        <local>
            <condition>
                <if>
                    <move>
                        <input path="IdentityMappedIssuedBy"/>
                        <output path="IdentityMappedIssuedBy"/>
                    </move>
                </if>
            </condition>
```

## Preferred:



messageSet.mset | RemoveEmptyN... | Mapping_Work | Mapping_Work... | MessageMap2 | MessageMap2.ma

```
<?xml version="1.0" encoding="UTF-8"?><mappingRoot domainID="com.ibm.msl.mapping.xml" domainIDExt
    <input path="/OrderList.xsd"/>
    <output path="/PurchaseData.xsd"/>
    <namespaces>
        <namespace kind="extension" prefix="fn" uri="http://www.w3.org/2005/xpath-functions"/>
    </namespaces>
    <generation availableEngines="xquery" engine="xquery"/>
    <mappingDeclaration name="MapOrderList2PurchaseData">
        <input path="mb:msg(OrderList,assembly,,Properties)"/>
        <output path="mb:msg(PurchaseData,assembly,DFDL,Properties)"/>
        <local>
            <input path="Properties"/>
            <output path="Properties"/>
            <condition>
                <if>
                    <move>
                        <input path="IdentityMappedIssuedBy"/>
                        <output path="IdentityMappedIssuedBy"/>
                    </move>
                </if>
            </condition>
```

## References:

NA

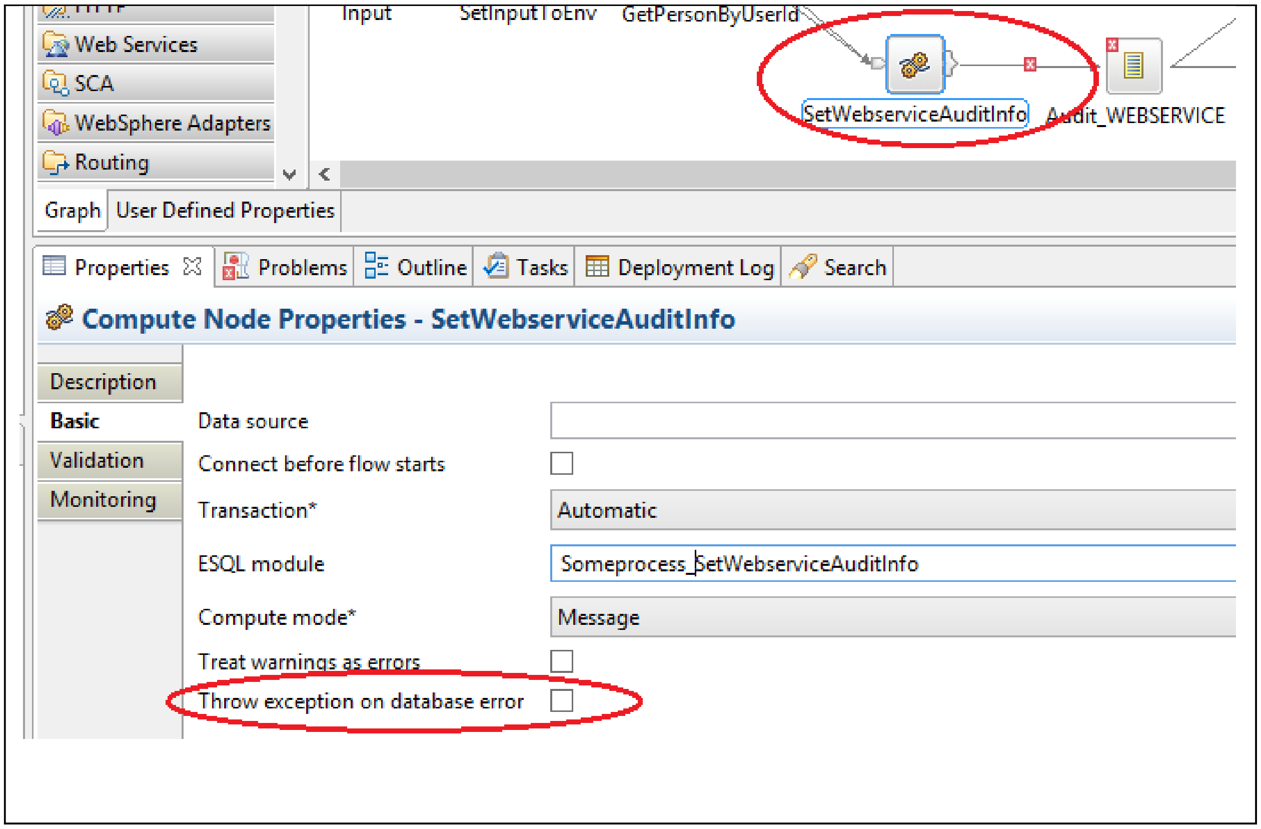
## Rule: Compute Nodes should throw exception on DB error

## Sonar Rule: R168

### Rational:

Compute nodes should normally throw an exception on a DB error.

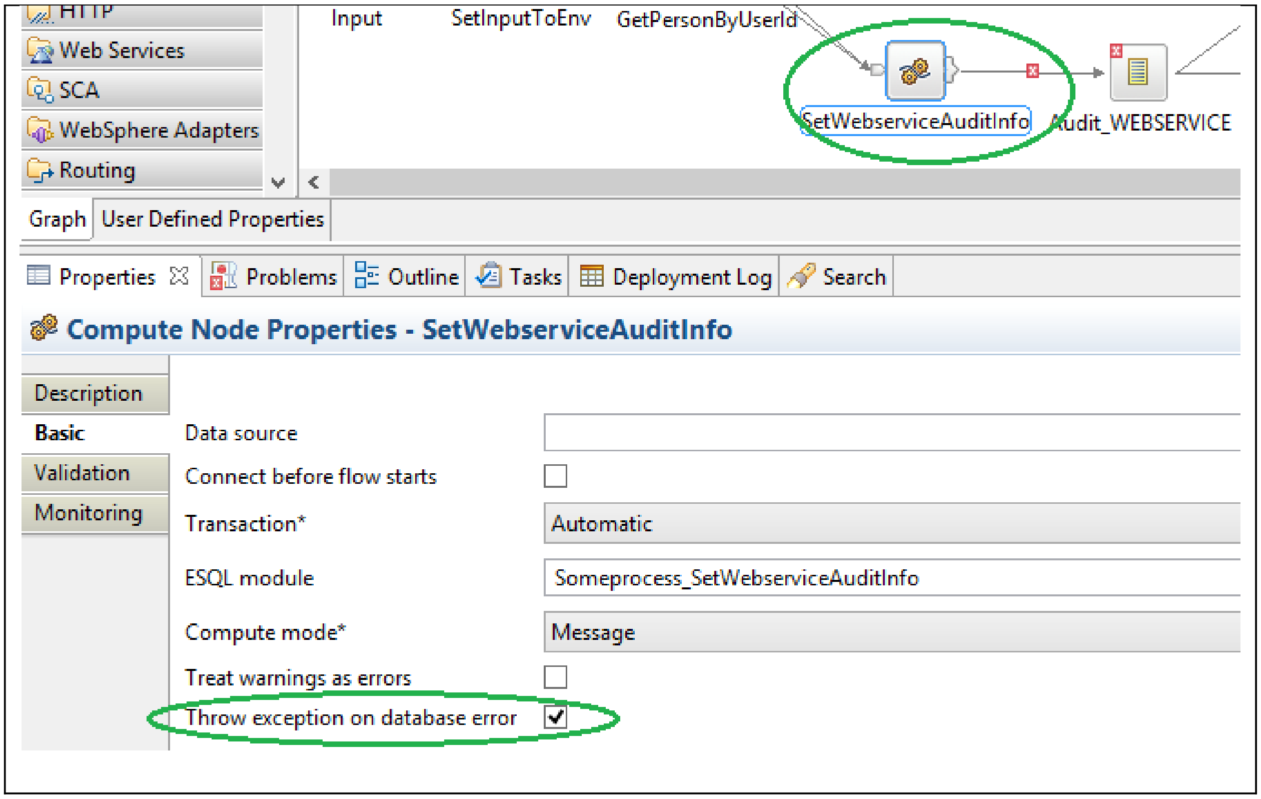
### Example:



Compute Node Properties - SetWebserviceAuditInfo

| | |
|---|---|
| Data source | |
| Connect before flow starts | ☐ |
| Transaction* | Automatic |
| ESQL module | Someprocess_SetWebserviceAuditInfo |
| Compute mode* | Message |
| Treat warnings as errors | ☐ |
| Throw exception on database error | ☐ |

Preferred:



Compute Node Properties - SetWebserviceAuditInfo

| | |
|---|---|
| Data source | |
| Connect before flow starts | ☐ |
| Transaction* | Automatic |
| ESQL module | Someprocess_SetWebserviceAuditInfo |
| Compute mode* | Message |
| Treat warnings as errors | ☐ |
| Throw exception on database error | ✓ |

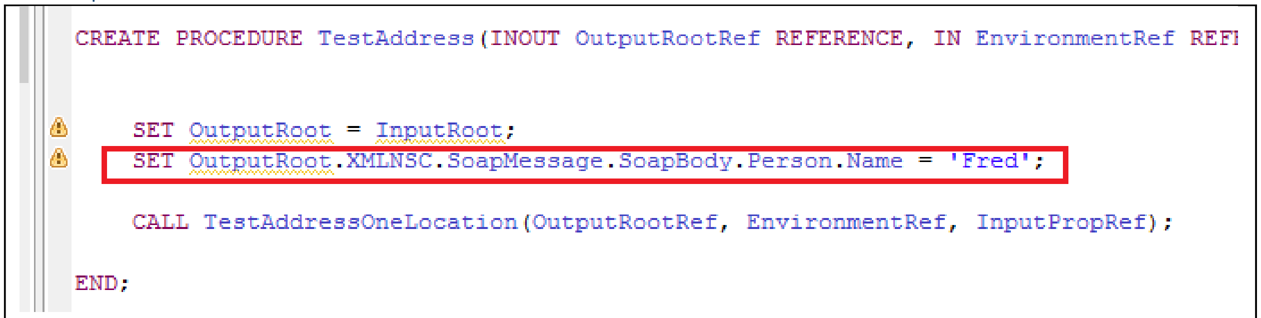
References:
NA

## Rule: Prefer SOAP domain over using from SOAP in XML or XMLNSC

## Sonar Rule: R177

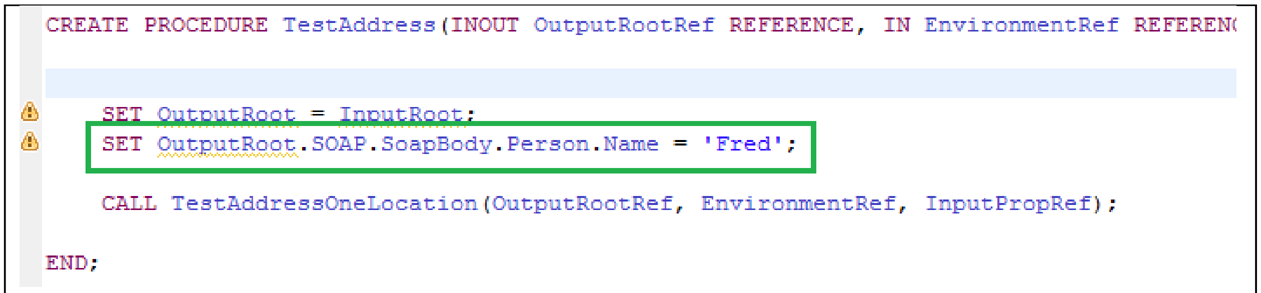
Rational:
Use the SOAP domain and parser where appropriate.

Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFI


    SET OutputRoot = InputRoot;
    SET OutputRoot.XMLNSC.SoapMessage.SoapBody.Person.Name = 'Fred';

    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENC


    SET OutputRoot = InputRoot;
    SET OutputRoot.SOAP.SoapBody.Person.Name = 'Fred';

    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

References:
NA

# General Coding Style

## Rule: Duplicate procedure/function names found

### Sonar Rule: R107

#### Rational:

The functions and procedures should have descriptive names. If they have the same name either the name may not be descriptive enough or it may be duplicate logic that could be refactored. Duplicate procedure/function names can lead to confusion.

#### Example:

NA

#### Preferred:

Make names more specific or refactor the code.

#### References:

NA

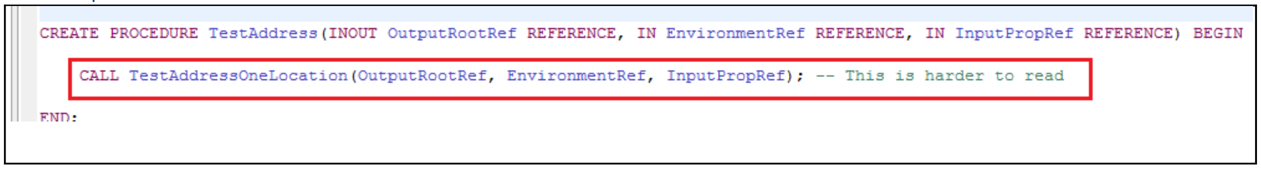
## Rule: The code contains both code and comments

### Sonar Rule: R141

#### Rational:

The line of code contains both code and comments. This makes the comment more difficulty to read.

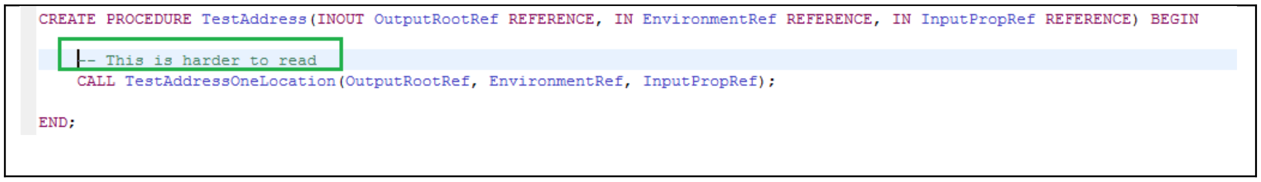
#### Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE, IN InputPropRef REFERENCE) BEGIN

    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef); -- This is harder to read

END;
```

#### Preferred:

Split the comment onto the previous line.



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE, IN InputPropRef REFERENCE) BEGIN

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

#### References:

NA

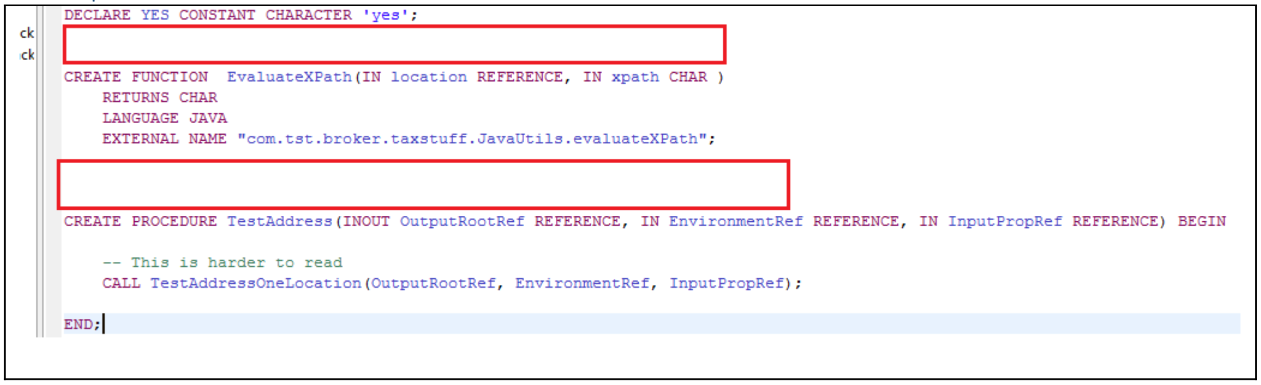
## Rule: Functions/Procedures/Modules should have comments at the start

## Sonar Rule: R142

### Rational:

Comments help other developers understand the codes intent.

### Example:



```
DECLARE YES CONSTANT CHARACTER 'yes';

CREATE FUNCTION  EvaluateXPath(IN location REFERENCE, IN xpath CHAR )
    RETURNS CHAR
    LANGUAGE JAVA
    EXTERNAL NAME "com.tst.broker.taxstuff.JavaUtils.evaluateXPath";

CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE, IN InputPropRef REFERENCE) BEGIN

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

### Preferred:

NA

### References:

NA

## Rule: The line is extra long and may cause issues being viewed

## Sonar Rule: R19

### Rational:

Long lines are harder to understand and may be inherently complex.

### Example:

```
IF (XMLNSC.Data.Content.Value = LocalEnvironment.ThePersonNameWeAreProcessing.Name) THEN
```

### Preferred:

Split lines to make them readable

```
IF (XMLNSC.Data.Content.Value =
        LocalEnvironment.ThePersonNameWeAreProcessing.Name) THEN
```

Or

```
BOOLEAN equal = FALSE;
SET equals = XMLNSC.Data.Content.Value =
LocalEnvironment.ThePersonNameWeAreProcessing.Name;
```

```
IF (equal = TRUE)  THEN
```

### References:
NA

## Rule: Multiple statements on the same line
## Sonar Rule: R47
### Rational:
Multiple statements on the same line make the code difficult to read and understand.

### Example:
```
SET description = 'Fred'; SET age='21'; SET height = 20;
```

### Preferred:
Split lines to make them readable

```
SET description = 'Fred';
SET age='21';
SET height = 20;
```

### References:
NA

## Rule: Case has no default ELSE statement
## Sonar Rule: R46
### Rational:
A case statement with no default path could indicate a logic error. It can also be confusing.

### Example:
```
SET description =
       CASE age
              WHEN '0' THEN 'really young'
              WHEN '100' THEN 'really old'
       END;
```

### Preferred:
```
SET description =
       CASE age
              WHEN '0' THEN 'really young'
              WHEN '100' THEN 'really old'
              ELSE 'Somewhere inbetween'
```

```
        END;
```

### References:

http://coding.tocea.com/java/sf_switch_no_default/

http://checkstyle.sourceforge.net/config_coding.html#MissingSwitchDefault

## Rule: Case statement has single WHEN. Could be replaced by an IF statement

## Sonar Rule: R45

### Rational:

Case statements with only 2 conditions are essentially “IF” conditions. Use an “IF” condition as it is easier to read.

### Example:

```
CASE Environment.Variables.PersonType
        WHEN 1 THEN
                SET Environment.Variables.ItsABoy = 'TRUE';
                SET Environment.Variables.LowerName = lowerType;
END CASE;
```

### Preferred:

Is equivalent to:

```
IF (Environment.Variables.PersonType = 1) THEN
      SET Environment.Variables.ItsABoy = 'TRUE';
      SET Environment.Variables.LowerName = lowerType;
END IF;
```

### References:

NA

## Rule: The line is extra long and may cause issues being viewed

## Sonar Rule: R19

### Rational:

Longer lines may require scrolling to be seen by developers on their screens. Also, files with longer lines are more difficult to print.

The default value is 130, but can be over-ridden by setting the property

```
sonar.mb.esql.maxlinesize=size
```

In the sonar.properties file for the project.

Example:
NA

Preferred:
Reformat longer lines to be more readable.

References:
NA

## Rule: Keywords should be in upper case

### Sonar Rule: R1

Rational:
For highlighting keyworcds in ESQL, they should be in uppercase.

Example:

**declare** ptrException **reference** **to** InputTree.*[1];

Preferred:

**DECLARE** ptrException **REFERENCE** **TO** InputTree.*[1];

References:

http://www.ibm.com/developerworks/websphere/library/techarticles/0803_shen/0803_shen.html

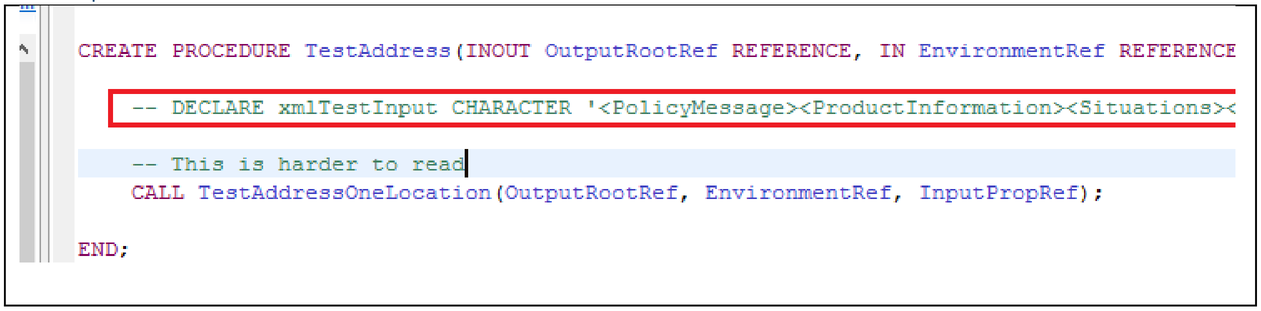
http://pic.dhe.ibm.com/infocenter/ratdevz/v8r0/index.jsp?topic=%2Fcom.ibm.etools.est.doc%2Fref%2Frsfsql027.html

## Rule: Commented out code

### Sonar Rule: R169

Rational:
Code has been commented out. The code should be removed.

Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERENCE
    -- DECLARE xmlTestInput CHARACTER '<PolicyMessage><ProductInformation><Situations><

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:

NA

References:

NA

## Complexity

### Rule: The parameter on a method/procedure has a short name (and is likely to be meaningless)

### Sonar Rule: R42

#### Rational:

Parameters passed to functions and procedures should be meaningful and ideally reveal their intent where possible.

The minimum length for each parameter that the check will use is controlled by the “sonar.mb.esql.parameterlength” property in the sonar.properties file. The default minimum length is “2”.

```
sonar.mb.esql.parameterlength=4
```

#### Example:

```
CREATE PROCEDURE SetEmailParms (IN Er REFERENCE)

        BEGIN
```

#### Preferred:

Give procedure/function parameter definitions meaningful names.

```
CREATE PROCEDURE SetEmailParms (IN EmailReference REFERENCE)

        BEGIN
```

#### References:

NA

### Rule: The method/procedure has a higher number of parameters then the threshold

### Sonar Rule: R41

#### Rational:

Lots of parameters for a function or procedure could indicate that the function/procedure is more complicated then it needs to be. This check is controlled by the “sonar.mb.esql.parametercount” property in the sonar.properties file. The default value is “10”.

For example

```
sonar.mb.esql.parametercount=5
```

States that if a function/procedure has more then 5 parameters a violation will be issued.

### Example:

```
CREATE PROCEDURE SetEmailParms (IN Environment REFERENCE,
                                IN EventCode CHARACTER,
                                IN ReplaceValue CHARACTER,
                                IN RecipientTo CHARACTER,
                                IN Retries INTEGER)
BEGIN
```

### Preferred:

Look (in-conjuction with the unused parameters/variables check) at whether all the parameters are required, or whether the procedure could be simplifed.

### References:

NA

## Rule: Negative IF / ELSE condition

### Sonar Rule: R2

### Rational:

Negative conditions are harder to understand conceptually then positive conditions.

### Example:

```
IF FIELDNAME(CreditorRole.ns:NextParty) is not null THEN
  SET NextPartyCreditorRole = NextPartyCreditorRole + 1;
  MOVE CreditorRole FIRSTCHILD;
ELSE
  LEAVE X;
END IF;
```

### Preferred:

```
IF FIELDNAME(CreditorRole.ns:NextParty) is null THEN
  LEAVE X;
ELSE
```

```
   SET NextPartyCreditorRole = NextPartyCreditorRole + 1;
   MOVE CreditorRole FIRSTCHILD;
END IF;
```

These two pieces of code are logically the same but the preferred is more readable.

## References:

NA

## Database checks

### Rule: JDBC has not been configured

### Sonar Rule: R4

#### Rational:

The MB-Precise plugin will attempt to validate your ESQL and MsgFlow code against any databases that the code is using. If the plugin detects database access code (a SELECT, DELETE, INSERT, UPDATE), it will attempt to validate that the tables and columns that the SQL is referencing are valid and consistent.

#### Example:

NA

#### Preferred:

Configure in the sonar.properties file the connection information of your database.

```
sonar.mb.jdbc.driver=org.h2.Driver
sonar.mb.jdbc.url=jdbc:h2:mem:test;
sonar.mb.jdbc.user=sa
sonar.mb.jdbc.password=
```

#### References:

NA

### Rule: A table being referenced has not been found in the DB schema

### Sonar Rule: R6

#### Rational:

The MB-Precise plugin will attempt to validate your ESQL and MsgFlow code against any databases that the code is using. If the plugin detects database access code (a SELECT, DELETE, INSERT, UPDATE), it will attempt to validate that the tables and columns that the SQL is referencing are valid and consistent. Inconsistent code could indicate that a table or column name has been misspelled or is missing from the DB environment.

#### Example:

NA

#### Preferred:

Check that the table exists in the database and the spelling matches.

#### References:

NA

## Rule: A column being referenced has not been found in the DB schema

### Sonar Rule: R7

### Rational:

The MB-Precise plugin will attempt to validate your ESQL and MsgFlow code against any databases that the code is using. If the plugin detects database access code (a SELECT, DELETE, INSERT, UPDATE), it will attempt to validate that the tables and columns that the SQL is referencing are valid and consistent. Inconsistent code could indicate that a column name has been misspelled or is missing from the DB environment.

### Example:

```
SET LocalEnvironment.Variables.SelectData[] = PASSTHRU('SELECT Name, Age, Height ' ||
                                                       'FROM THEDATA.PersonTable');
```

### Preferred:

Check that the column exists in the database in the expected table and the spelling matches.

### References:

NA

## Rule: A column being referenced has not been indexed. This may be a performance issue

### Sonar Rule: R8

### Rational:

The MB-Precise plugin will attempt to validate your ESQL and MsgFlow code against any databases that the code is using. If the plugin detects database access code (a SELECT, DELETE, INSERT, UPDATE), it will attempt to validate that the tables and columns that the SQL is referencing are valid and consistent. This warning indicates that columns that a table are being accessed by are not indexed.

### Example:

```
SET LocalEnvironment.Variables.SelectData[] = PASSTHRU('SELECT Name, Age, Height ' ||
                                                       'FROM THEDATA.PersonTable' ||
                                                       'WHERE Wieght > ?', weight);
```

### Preferred:

This may or not be an issue depending upon the table being accessed size and the frequency of access. Analysis of the amount of expected data in the tables affected should be undertaken with the DBA to see if this will be an issue in a production system.

### References:

NA

## MQ Configuration

### Rule: MQ Definition file has not been configured or doesn't refer to a valid file

### Sonar Rule: R10

#### Rational:

The MB-Precise plugin will attempt to validate your MQ queues and topics against your ESQL and Msgflow code to make sure that all queues being accessed have been defined via a confiuration script, and that all queues defined are being used (that there are no redundant queues in the application).
To do this analysis the tools needs to access the "mqsc configuration file that the queues are defined in.
This error indicates that the queue file path has not been defined or is not valid.

#### Example:

For example a file might contain queue definitions:

```
************************************************
*  Define the queues for the application
************************************************


DEFINE QL('Unused.Queue.Defined.in.file') REPLACE
* DEFINE QLOCAL ('XML_PASSENGERQUERY_IN') REPLACE
```

#### Preferred:

Keep the ".mqsc" files up to date with the code to avoid issues when promoting through environments.

#### References:

NA

### Rule: MQ Queue defined but not used in the code

### Sonar Rule: R11

#### Rational:

The MB-Precise plugin will attempt to match queue configuration to queue used. This warning indicates that a queue is defined in the definition but not in the code.
It could mean that

- the queue is used in a different application
- the queue access is dynamic (ie dependant on logic in the code)
- the queue is never used and is redundant

#### Example:

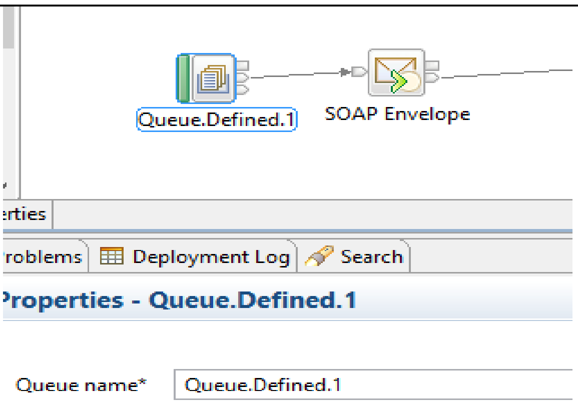
```
************************************************
*  Define the queues for the application
************************************************
DEFINE QL('Unused.Queue.Defined.in.file') REPLACE
```

### Preferred:
Check that the queue is accessed.

### References:
NA

## Rule: MQ Queue used in the code but not not listed in the definition file
### Sonar Rule: R12
### Rational:
The MB-Precise plugin will attempt to match queue configuration to queue used. This warning indicates that is referenced in the code but not defined.
It could mean that

- the queue was created in a different application
- the queue access is dynamic (ie dependent on logic in the code)
- the queue was manually created and should be part of the configuration file

### Example:


Properties - Queue.Defined.1

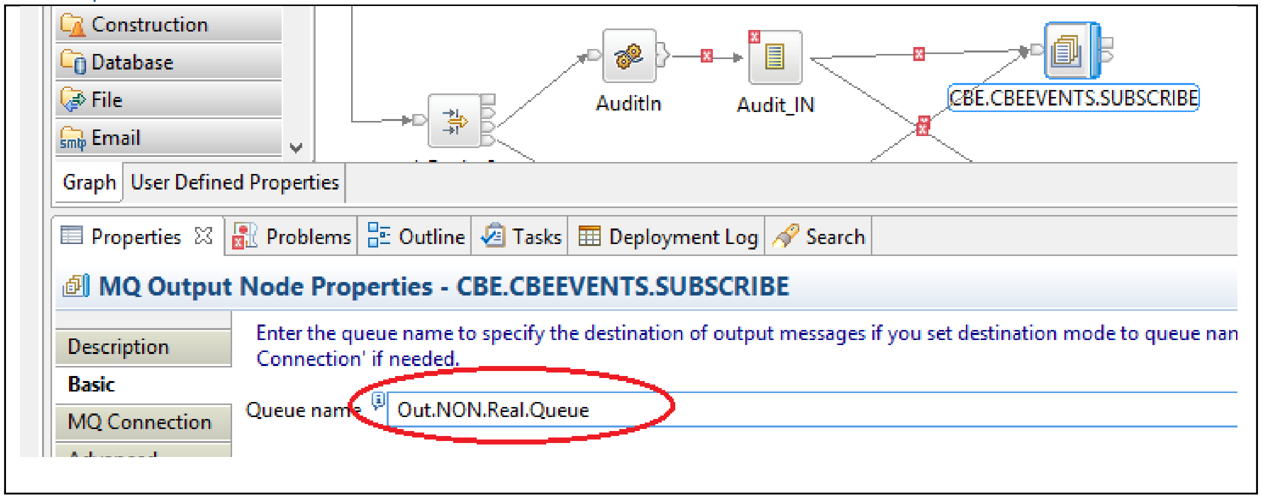
Queue name* Queue.Defined.1

### Preferred:
Check whether the queue accessed should be in the queue configuration file.

### References:
NA

## Rule: MQ Output nodes should to an alias queue
### Sonar Rule: R135
### Rational:
Writing to an alias queue allows additional logging and congiguration to be applied.

Example:



MQ Output Node Properties - CBE.CBEEVENTS.SUBSCRIBE

Enter the queue name to specify the destination of output messages if you set destination mode to queue nan Connection' if needed.

Queue name Out.NON.Real.Queue

Preferred:
NA

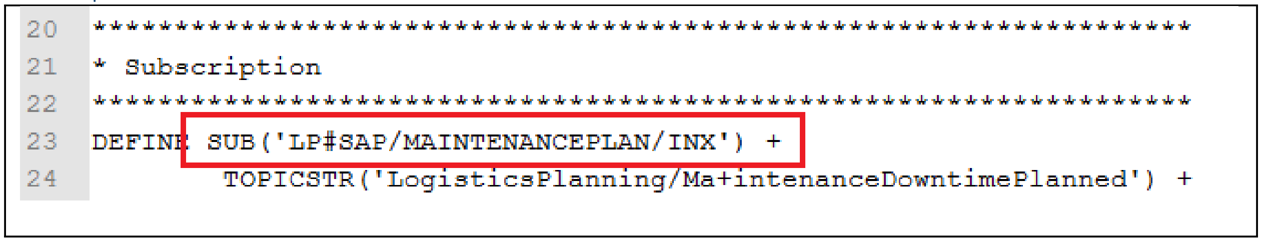
References:
NA

## Rule: Avoid special characters in TOPIC/SUB/QUEUE names

## Sonar Rule: R138

Rational:
Avoid special characters in MQ object names as they may fail on different platforms.

Example:



```
********************************************************************
* Subscription
********************************************************************
DEFINE SUB('LP#SAP/MAINTENANCEPLAN/INX') +
          TOPICSTR('LogisticsPlanning/Ma+intenanceDowntimePlanned') +
```

Preferred:
NA

References:
NA

## Message Broker Performance

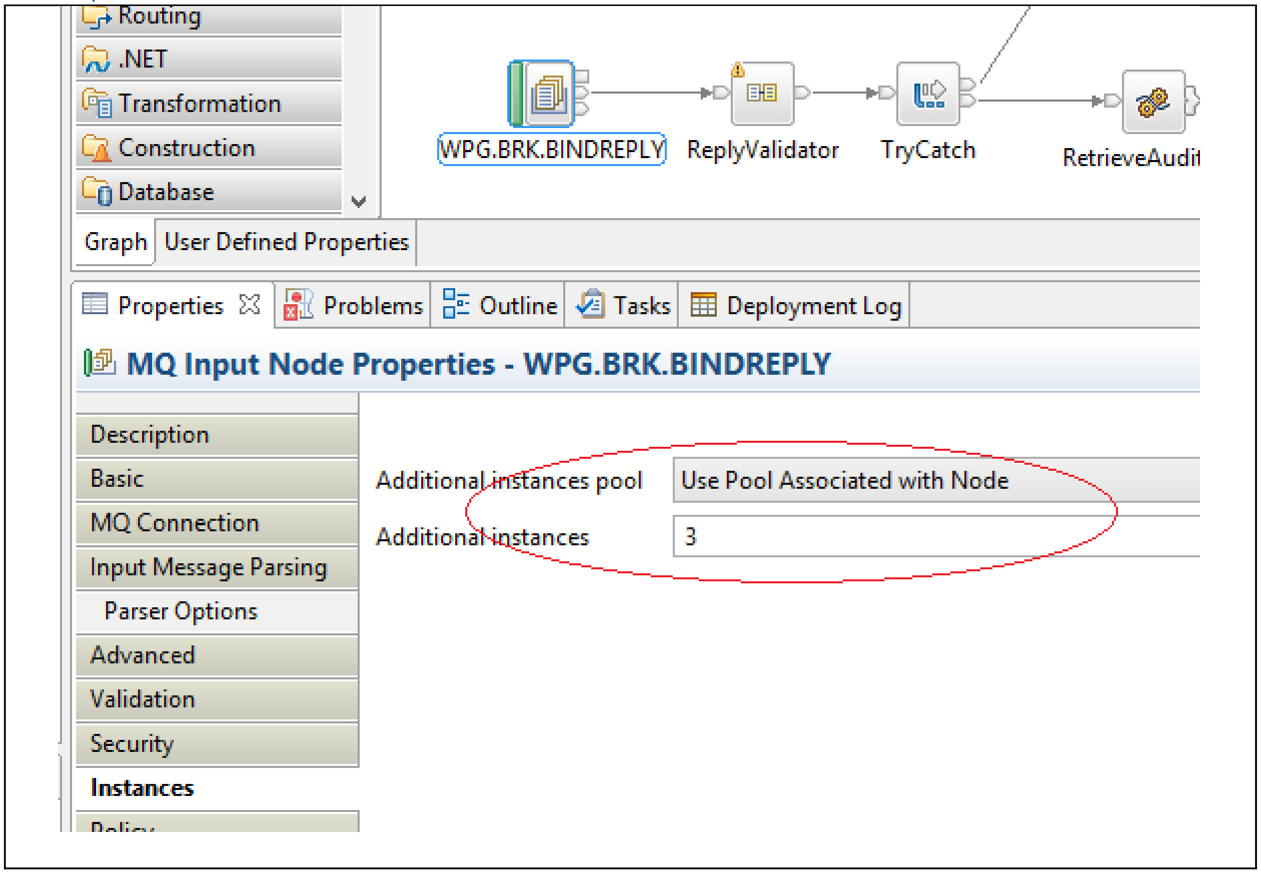
### Rule: Input node allows for multiple instances

### Sonar Rule: R110

Rational:

Some organisation choose to scale by using multiple Execution Groups rather then multiple instances.

Example:



MQ Input Node Properties - WPG.BRK.BINDREPLY

Additional instances pool: Use Pool Associated with Node

Additional instances: 3

Preferred:

NA

References:

NA

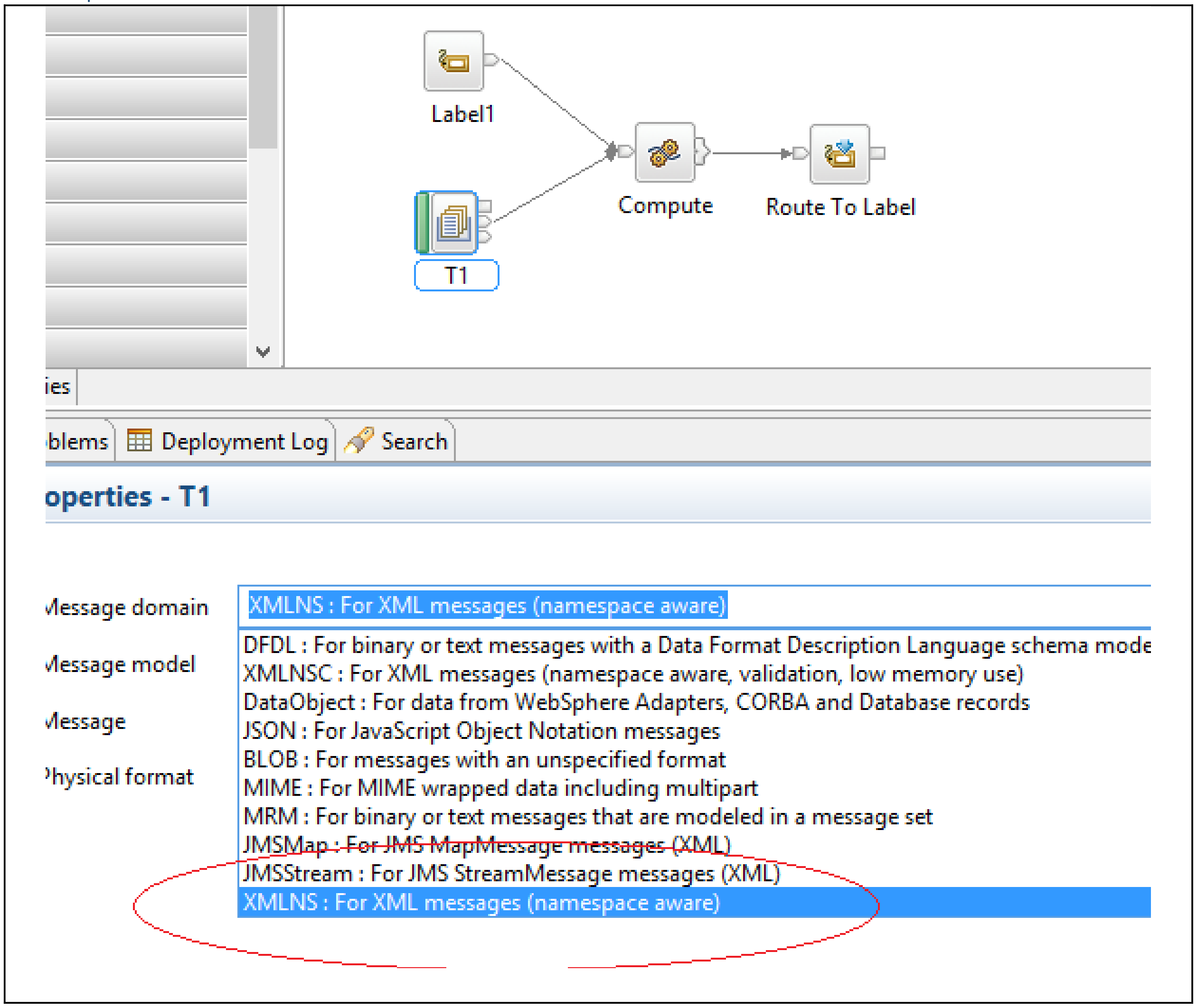
### Rule: Use XMLNSC over XMLNS

### Sonar Rule: R3

Rational:

Use XMLNSC over XMLNS where possible. XMLNSC is more efficient.

Example:



operties - T1

Message domain: XMLNS : For XML messages (namespace aware)

Message model

Message

Physical format

DFDL : For binary or text messages with a Data Format Description Language schema mode
XMLNSC : For XML messages (namespace aware, validation, low memory use)
DataObject : For data from WebSphere Adapters, CORBA and Database records
JSON : For JavaScript Object Notation messages
BLOB : For messages with an unspecified format
MIME : For MIME wrapped data including multipart
MRM : For binary or text messages that are modeled in a message set
~~JMSMap : For JMS MapMessage messages (XML)~~
JMSStream : For JMS StreamMessage messages (XML)
XMLNS : For XML messages (namespace aware)

Preferred:
NA

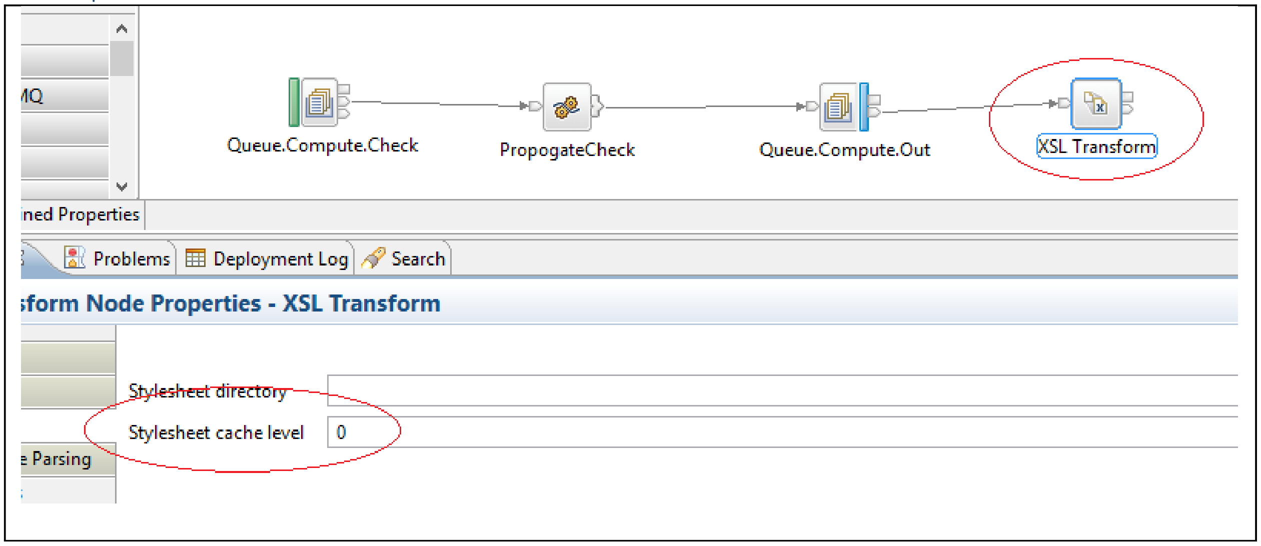
References:
NA

## Rule: The XSL cache is set to 0, so style sheets will be compiled each time the node runs

## Sonar Rule: R100

Rational:
Caching of style sheets can improve performance.

Example:



Stylesheet directory

Stylesheet cache level 0

Preferred:

NA

References:

NA

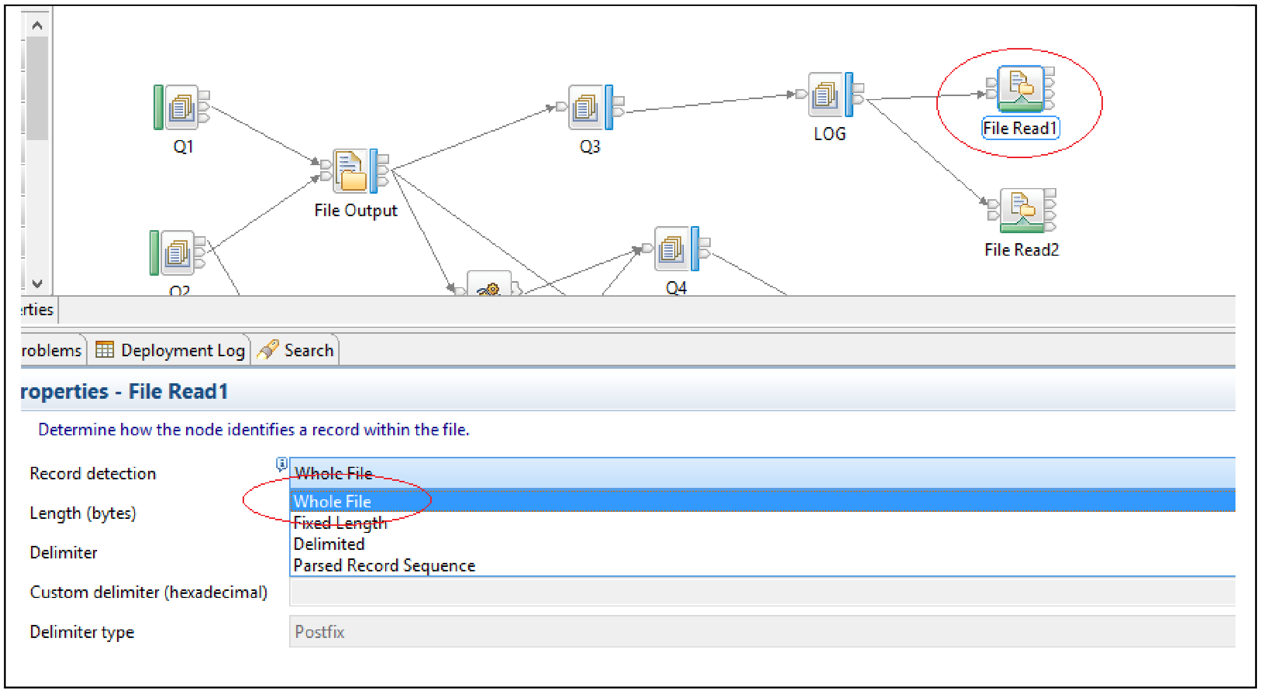
## Rule: Reading whole file may cause issues with performance. Split into batches where possible

Sonar Rule: R106

Rational:

Reading the whole file can affect performance.

Example:



roperties - File Read1

Determine how the node identifies a record within the file.

| | |
|---|---|
| Record detection | Whole File |
| Length (bytes) | |
| Delimiter | |
| Custom delimiter (hexadecimal) | |
| Delimiter type | Postfix |

[✓ Whole File]
Fixed Length
Delimited
Parsed Record Sequence

Preferred:

NA

References:

NA

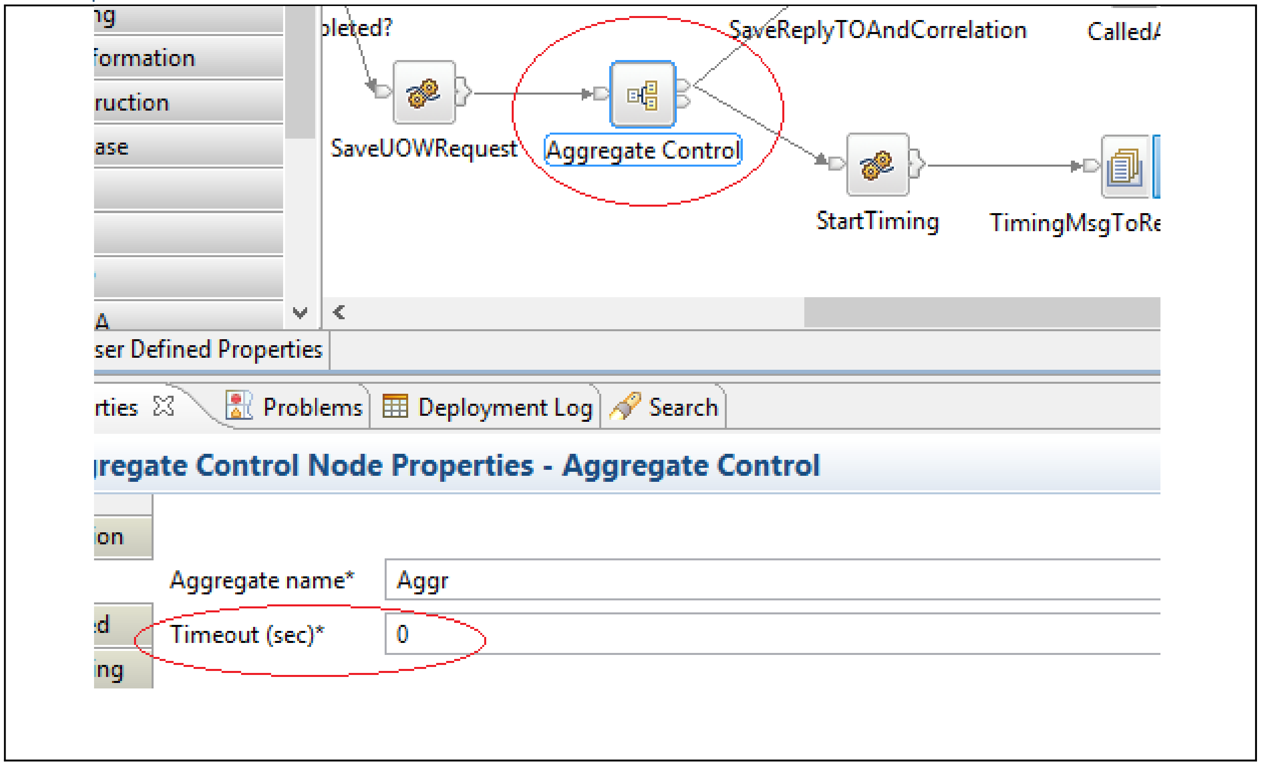
## Rule: The AggregateControl Node has an infinite timeout set. This may cause flows to never complete if all replies do not arrive

Sonar Rule: R97

Rational:

An aggregate node that waits indefinitely may block the execution group.

Example:



Aggregate name* Aggr

Timeout (sec)* 0

Preferred:

NA

References:

NA

## Rule: BITSTREAM is deprecated. Use ASBITSTREAM instead

Sonar Rule: R58

Rational:

BITSTREAM has been deprecated.

Example:

```
SET Env.Person.PersonId =BITSTREAM(Env.Person.Image);
```

Preferred:

```
SET Env.Person.PersonId = ASBITSTREAM(Env.Person.Image, InputRoot.Properties.Encoding,
InputRoot.Properties.CodedCharSetId);
```

References:

NA

## Rule: SLEEP() has been called. Calling SLEEP blocks the flow in the execution group

### Sonar Rule: R44

#### Rational:

Calling SLEEP within an ESQL file causes the thread to pause, which prevents the execution group form processing any other messages for that flow. Calling SLEEP could indicate an issue with the architecture that may be able to be addressed in a non-blocking fashion.

#### Example:

```
CALL SLEEP(1000);
```

#### Preferred:

Limit the calls to SLEEP and investigate alternatives.

#### References:

NA

## Rule: Using a SELECT * will affect the resources used (memory) if not all the fields are required

### Sonar Rule: R39

#### Rational:

When Message Broker brings back the records from a database query, they take resources (CPU and memory). If the a wider select is used then what is required by the logic, then more CPU and memory is required for the query to run.

#### Example:

```
SET LocalEnvironment.Variables.SelectData[] = PASSTHRU('SELECT * ' ||
                                                        'FROM THEDATA.PersonTable' ||
                                                        'WHERE Wieght > ?', weight);
```

### Preferred:

Use a narrower list of fields/columns that match what is required by the logic where possible. An alternative is to make use of views that only provide the necessary data when a "SELECT *" is used.

### References:

NA

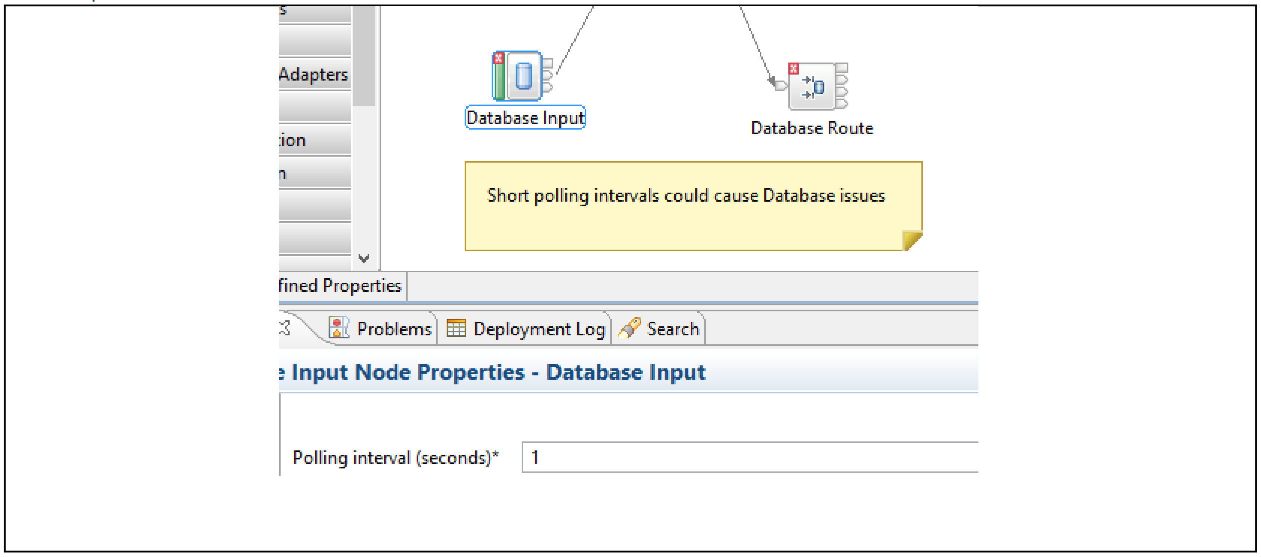
## Rule: Database access with low polling interval could cause database contention issues for other applications/code

### Sonar Rule: R38

### Rational:

The DatabaseInput node polls the database at a set interval. If that interval is low, this could cause issues with other users running queries against the database.

### Example:



Short polling intervals could cause Database issues

Input Node Properties - Database Input

Polling interval (seconds)* 1

### Preferred:

Analyse the database usage and load to make sure that multiple Message Broker DatabaseInput nodes aren't causing database contention.

### References:

NA

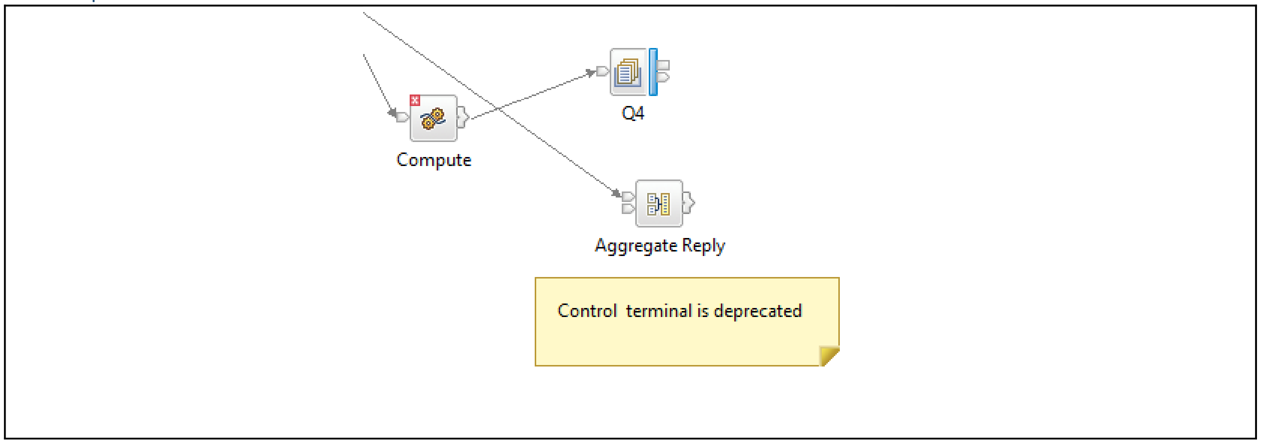
## Rule: A terminal that has been deprecated is being used

### Sonar Rule: R88

#### Rational:

The AggregateReply node 'control' terminal has been deprecated.

#### Example:



#### Preferred:

Make use of the AggregateControl component.

#### References:

[http://www-01.ibm.com/support/knowledgecenter/SSKM8N_8.0.0/com.ibm.etools.mft.doc/ac04750_.htm](http://www-01.ibm.com/support/knowledgecenter/SSKM8N_8.0.0/com.ibm.etools.mft.doc/ac04750_.htm)

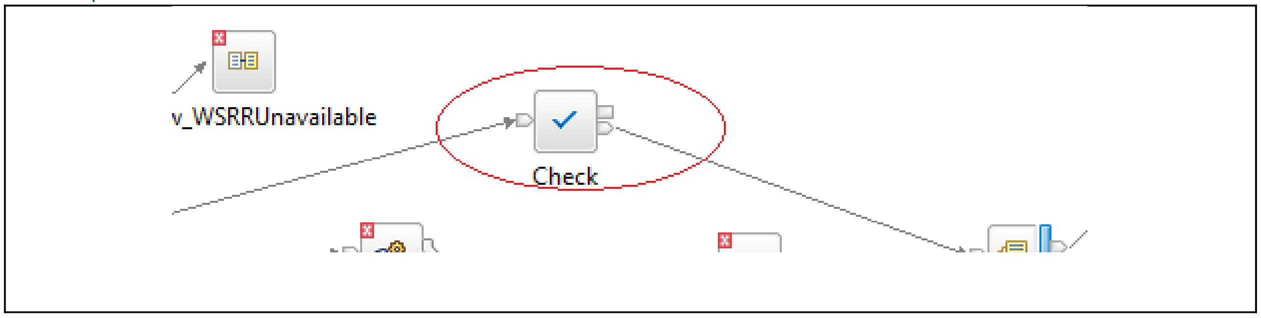
## Rule: Check node found in the flow. Check node has deprecated by the validation node

### Sonar Rule: R37

#### Rational:

The check node is deprecated and been replaced by a better performing validation node.

#### Example:



### Preferred:
Replace check nodes with validation nodes.

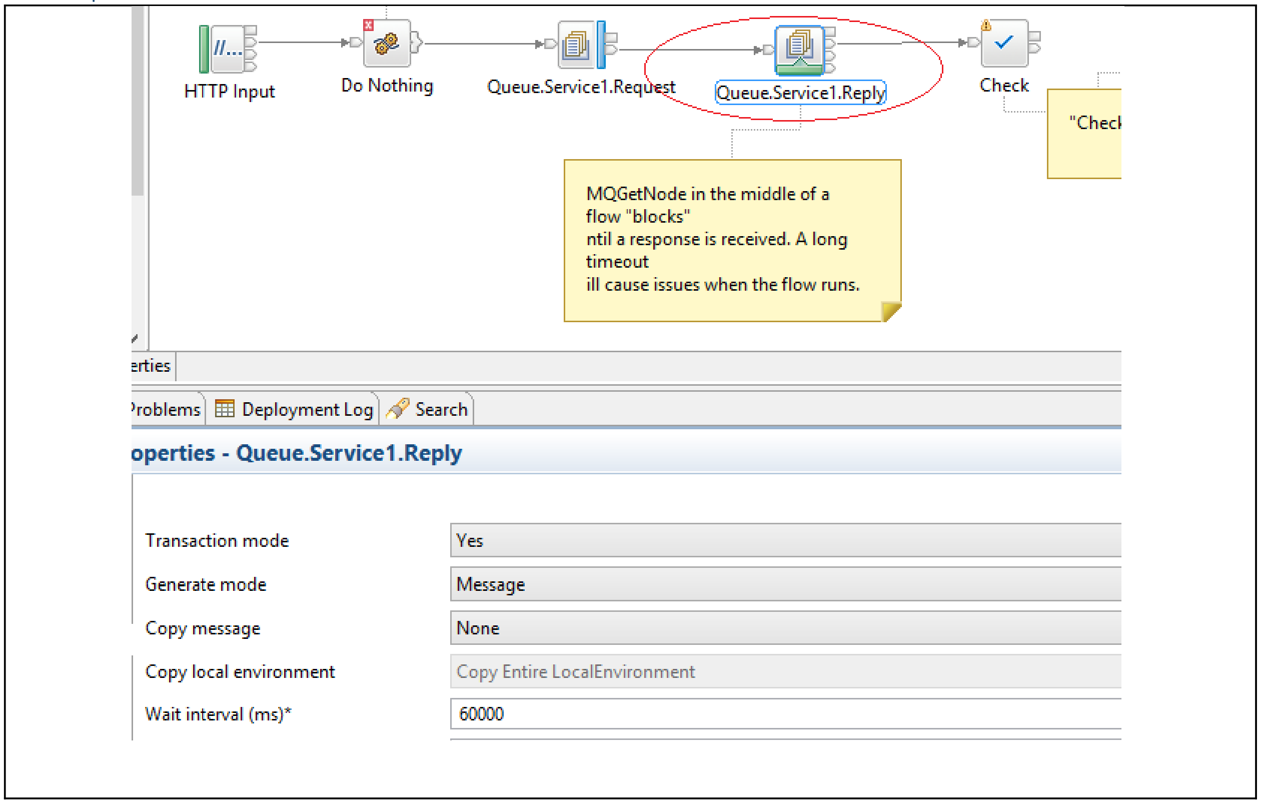
### References:
NA

## Rule: The node has a very long delay waiting for a response. This will cause blocking of the runtime and could suggest issue with the design/architecture

## Sonar Rule: R34

### Rational:
When waiting for a response from a queue (via an MQGet), the flow is essentially blocked.  A long waiting time will affect through-put and the performance of broker.

## Example:



MQGetNode in the middle of a flow "blocks"
ntil a response is received. A long timeout
ill cause issues when the flow runs.

operties - Queue.Service1.Reply

| | |
|---|---|
| Transaction mode | Yes |
| Generate mode | Message |
| Copy message | None |
| Copy local environment | Copy Entire LocalEnvironment |
| Wait interval (ms)* | 60000 |

## Preferred:

Alternative design patterns are available that may allow long waits to be avoided.

## References:

NA

## Rule: Use LocalEnvironment over Environment

## Sonar Rule: R23

## Rational:

The different environment trees have different scopes at runtime. The LocalEnvironment only lives as long as the compute node, so it is preferred to the Environment that lives as long as the flow.

## Example:

```
WHILE bLoop <= Cardinality(Environment.Variables.AListOfStuff[]) DO
        SET Environment.Variables.StuffLocation[bLoop+1] =
        Environment.Variables.AListOfStuff[bLoop].LocationValue1;
        SET bLoop = bLoop + 1;
END WHILE;
```

Preferred:

```
SET LocalEnvironment.P1.Name = OutputRoot.XMLNSC.Request.Person.Name;
```

References:

NA

## Rule: Avoid using CARDINALITY within loops

## Sonar Rule: R21

### Rational:

A CARDINALITY check is costly in terms of CPU. Having the check as a loop condition or within a loop should be avoided if possible.

Example:

```
WHILE bLoop <= Cardinality(Environment.Variables.AListOfStuff[]) DO
            SET Environment.Variables.StuffLocation[bLoop+1] =
            Environment.Variables.AListOfStuff[bLoop].LocationValue1;
            SET bLoop = bLoop + 1;
END WHILE;
```

Preferred:

```
DECLARE endLoop INTEGER;
SET  endLoop = Cardinality(Environment.Variables.AListOfStuff[]);
WHILE bLoop <= endLoop DO
            SET Environment.Variables.StuffLocation[bLoop+1] =
Environment.Variables.AListOfStuff[bLoop].LocationValue1;
            SET bLoop = bLoop + 1;
END WHILE;
```

References:

http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/bj28653_.htm

## Rule: Use XMLNSC over XMLNS

### Sonar Rule: R101

#### Rational:

The XMLNS parser has been deprecated. The XMLNSC parser is more efficient and uses less resources. It also allows for better levels of validation.

#### Example:

```
SET Environment.Variables.P1.State = OutputRoot.XMLNS.Request.Person.State;
```

#### Preferred:

```
SET Environment.Variables.P1.State = OutputRoot.XMLNSC.Request.Person.State;
```

#### References:

[http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/ad70530_.htm](http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/ad70530_.htm)

## Rule: Two or more RCD nodes in the same flow path

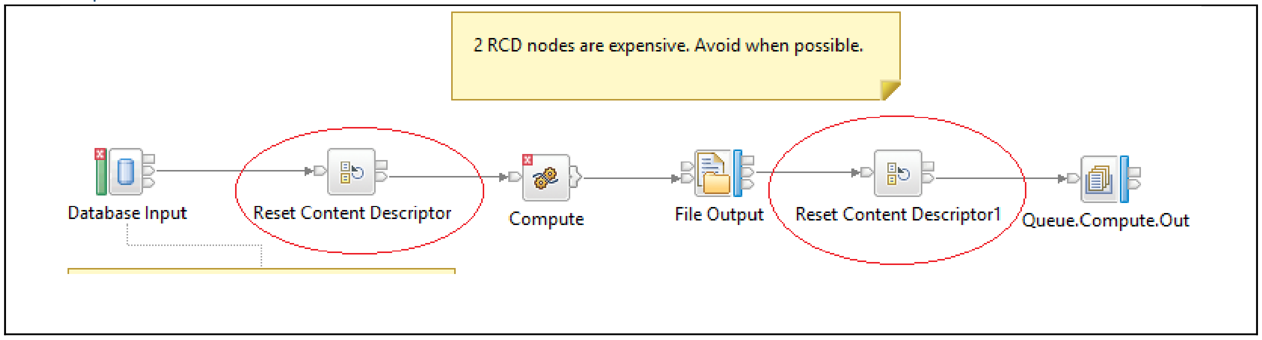
### Sonar Rule: R26

#### Rational:

RCD nodes are expensive, having 2 or more in the same flow path could cause performance issues.

“Avoid using Reset Content Descriptor nodes. An RCD node is intended to change the message domain which actually parses the complete message tree. This is both memory and CPU intensive activity.”

### Example:



### Preferred:

Look at whether an RCD could be replaced with an ASBISTREAM or some alternate approach.

### References:

http://www.ibm.com/developerworks/websphere/library/techarticles/0809_kudikala/0809_kudikala.html

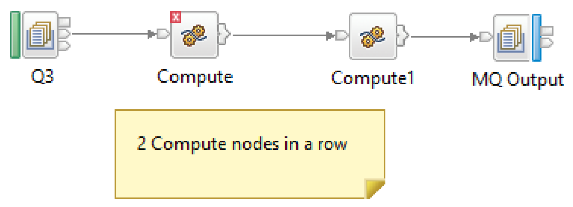
## Rule: The flow has two or more compute nodes in a row

## Sonar Rule: R14

### Rational:

Compute nodes need to do resource intensive parsing of messages. Two nodes in a row will be slower and take more resources then one node performing the same logic.

### Example:



### Preferred:

Rationalize the logic to have as few compute nodes as possible in each flow.

### References:

http://linderalex.blogspot.com.au/2010/07/developing-in-websphere-message-broker.html

## Rule: Navigating message tree could be replaced by a reference

## Sonar Rule: R15

### Rational:

Navigating the message tree can cause re-parsing of the message. By making use of a reference the code runs faster.

### Example:

```
SET personName = OutputRoot.XMLNSC.Request.Person.Name;
SET Environment.Variables.P1.Name = OutputRoot.XMLNSC.Request.Person.Name;
SET Environment.Variables.P1.Age = OutputRoot.XMLNSC.Request.Person.Age;
SET Environment.Variables.P1.PostCode = OutputRoot.XMLNSC.Request.Person.PostCode;
SET Environment.Variables.P1.FirstName = OutputRoot.XMLNSC.Request.Person.FirstName;
SET Environment.Variables.P1.LastName = OutputRoot.XMLNSC.Request.Person.LastName;
```

### Preferred:

```
DECLARE reqRef REFERENCE TO OutputRoot.XMLNSC.Request.Person;
SET personName = reqRef.Name;
SET Environment.Variables.P1.Name = reqRef.Name;
SET Environment.Variables.P1.Age = reqRef.Age;
SET Environment.Variables.P1.PostCode = reqRef.PostCode;
SET Environment.Variables.P1.FirstName = reqRef.FirstName;
SET Environment.Variables.P1.LastName = reqRef.LastName;
```

### References:

http://www-01.ibm.com/support/knowledgecenter/SSMKHH_9.0.0/com.ibm.etools.mft.doc/bj28653_.htm

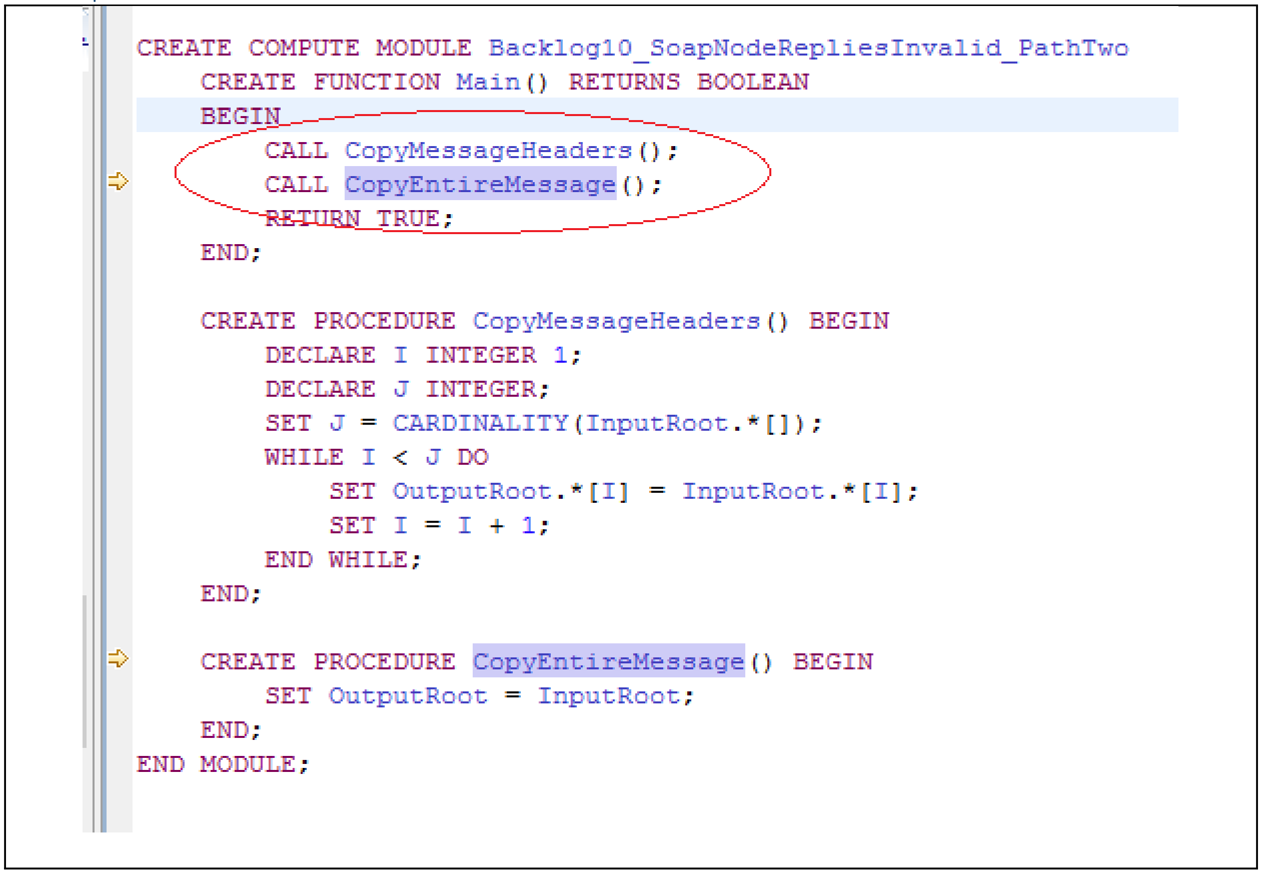
## Rule: CopyEntireMessage makes calling CopyMessageHeaders redundant

## Sonar Rule: R111

### Rational:

The code generated by message broker may need to tuned.

Example:



```
CREATE COMPUTE MODULE Backlog10_SoapNodeRepliesInvalid_PathTwo
    CREATE FUNCTION Main() RETURNS BOOLEAN
    BEGIN
        CALL CopyMessageHeaders();
        CALL CopyEntireMessage();
        RETURN TRUE;
    END;

    CREATE PROCEDURE CopyMessageHeaders() BEGIN
        DECLARE I INTEGER 1;
        DECLARE J INTEGER;
        SET J = CARDINALITY(InputRoot.*[]);
        WHILE I < J DO
            SET OutputRoot.*[I] = InputRoot.*[I];
            SET I = I + 1;
        END WHILE;
    END;

    CREATE PROCEDURE CopyEntireMessage() BEGIN
        SET OutputRoot = InputRoot;
    END;
END MODULE;
```

Preferred:

NA

References:

NA

## Message Broker Logic failures

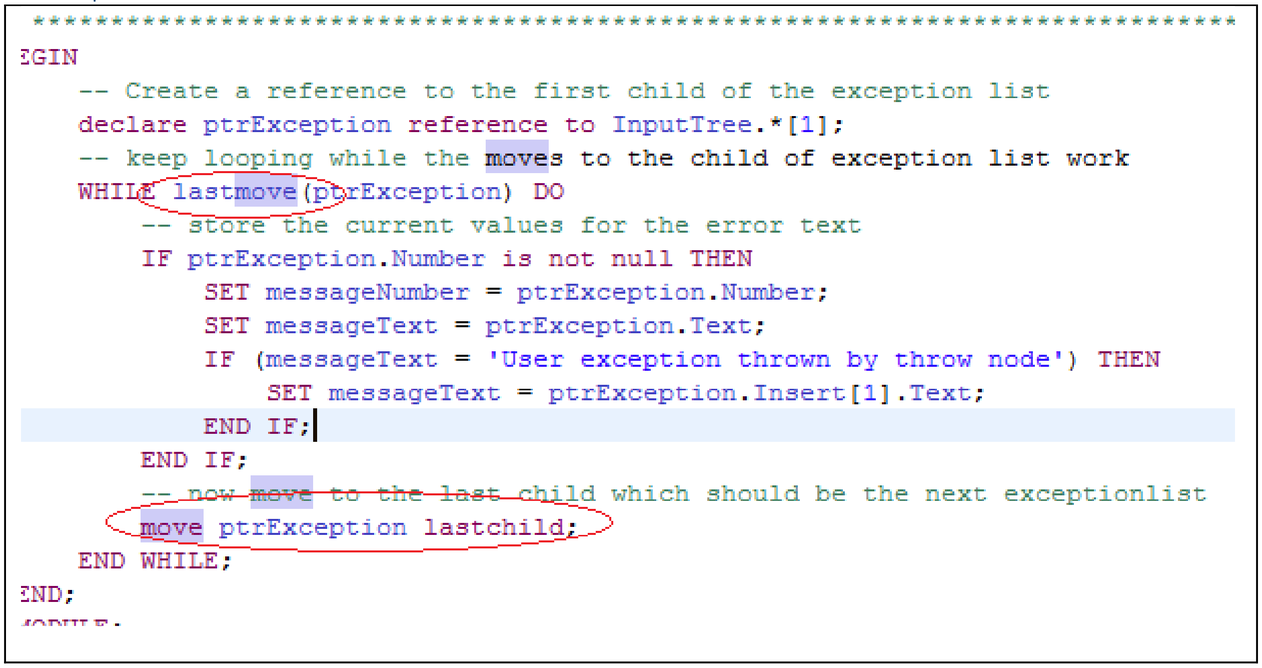
### Rule: Should check that the last MOVE completed

### Sonar Rule: R126

Rational:

When using 'MOVE', the variable or reference can be set to undefined and cause logic errors or exceptions. It is good defensive programming practice to check the 'MOVE' completed successfully.

Example:



```
 ****************************************************************************
EGIN
    -- Create a reference to the first child of the exception list
    declare ptrException reference to InputTree.*[1];
    -- keep looping while the moves to the child of exception list work
    WHILE lastmove(ptrException) DO
        -- store the current values for the error text
        IF ptrException.Number is not null THEN
            SET messageNumber = ptrException.Number;
            SET messageText = ptrException.Text;
            IF (messageText = 'User exception thrown by throw node') THEN
                SET messageText = ptrException.Insert[1].Text;
            END IF;
        END IF;
        -- now move to the last child which should be the next exceptionlist
        move ptrException lastchild;
    END WHILE;
END;
```

Preferred:

NA

References:

NA

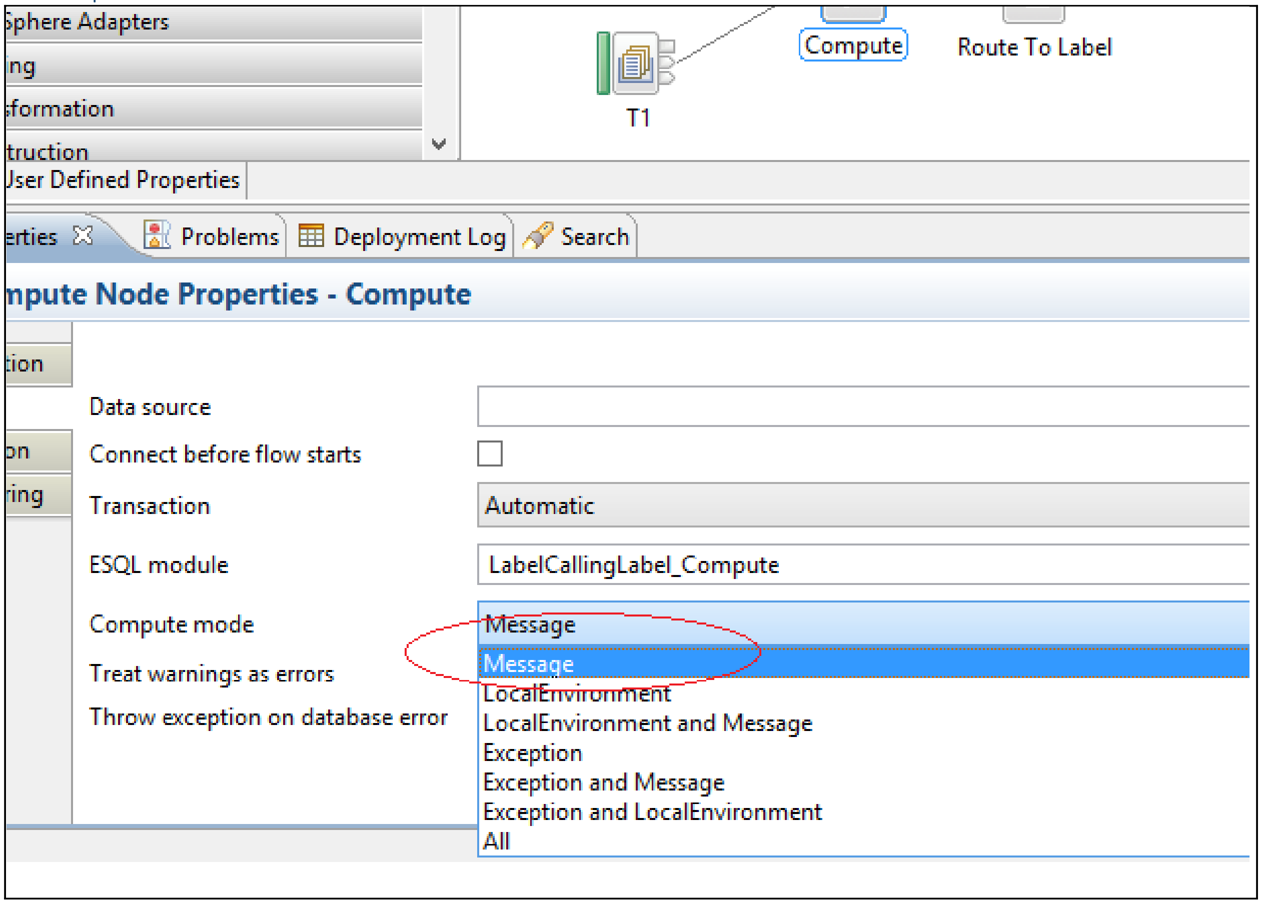
### Rule: The compute mode is message but the message is never read or written

### Sonar Rule: R93

Rational:

If the message is not being used then either the 'Compute Node' can be changed to be one of the other settings as to be more efficient. Otherwise if the message should be changed then this could indicate a logic error in the associated ESQL.

Example:



mpute Node Properties - Compute

Data source

Connect before flow starts ☐

Transaction: Automatic

ESQL module: LabelCallingLabel_Compute

Compute mode: Message

Treat warnings as errors

Throw exception on database error

Message
LocalEnvironment
LocalEnvironment and Message
Exception
Exception and Message
Exception and LocalEnvironment
All

Preferred:

NA

References:

NA

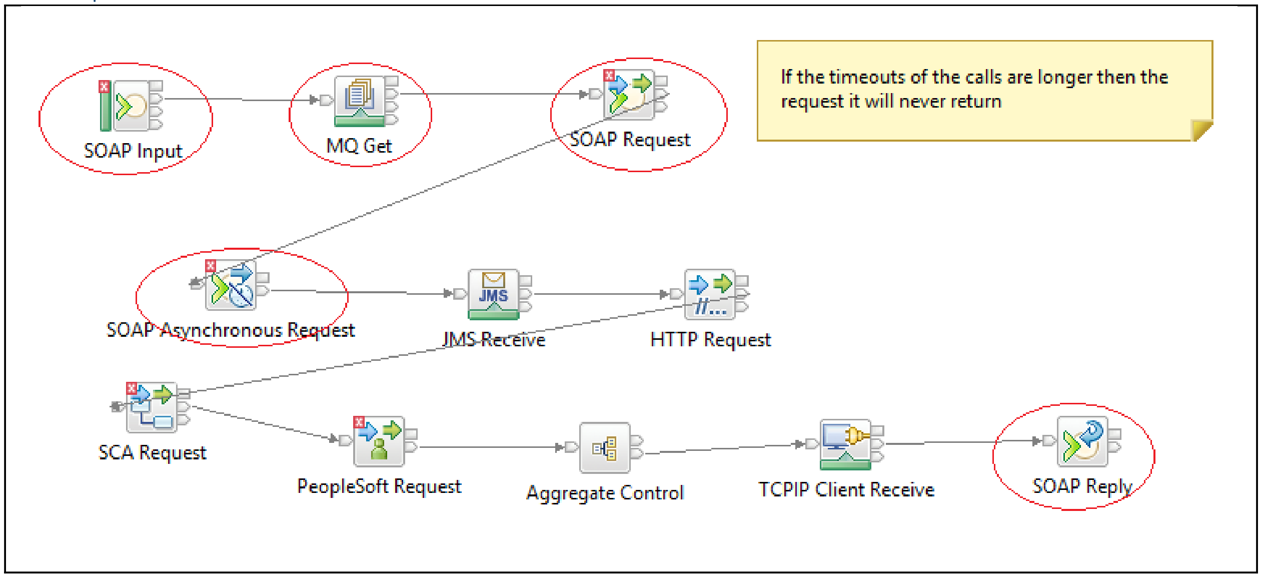
## Rule: The timeouts on the nodes in the flow are potentially longer than the allowed delay on the input node

Sonar Rule: R98

Rational:

If the input timeout and the maximum elapsed time that the nodes within the flow can take are not aligned then the request can timeout before the response has been created.

### Example:



### Preferred:

Adjust the timeout of the calls or the timeout of the request. As an alternative, you could look to make the requests idempotent to allow requests to be resent.

### References:

NA

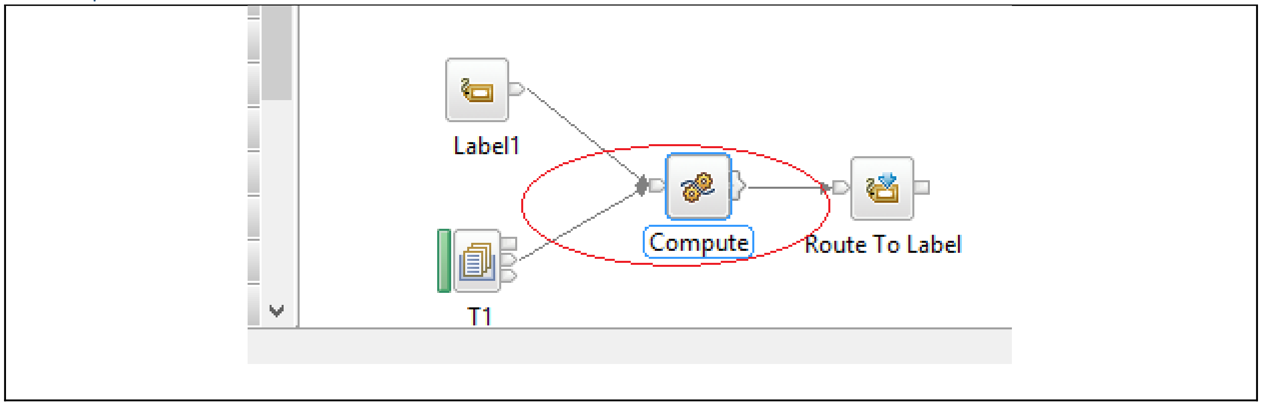
## Rule: The compute node never creates an output message

## Sonar Rule: R94

### Rational:

If the compute node is not creating an output message then this could indicate a logic failure.

### Example:



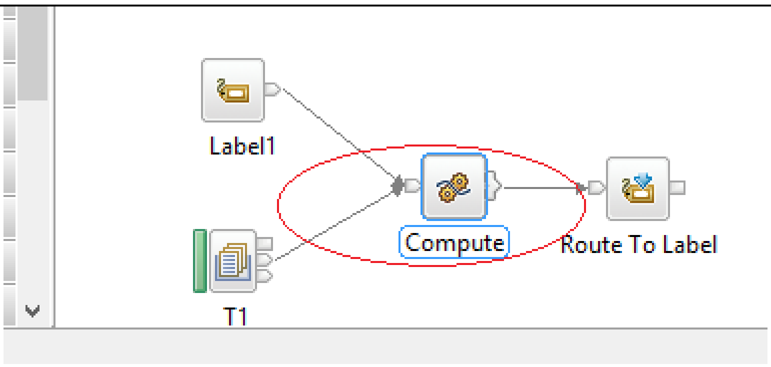
### Preferred:
NA

### References:
NA

## Rule: The main method is referred to by more then 1 compute node

### Sonar Rule: R95

### Rational:
If the compute nodes share an ESQL file, then they cannot be changed without altering the logic of the other flow.  It will also become confusing to maintain the logic.

### Example:


### Preferred:
If common logic is required then it may be preferable to create a common function/procedure.

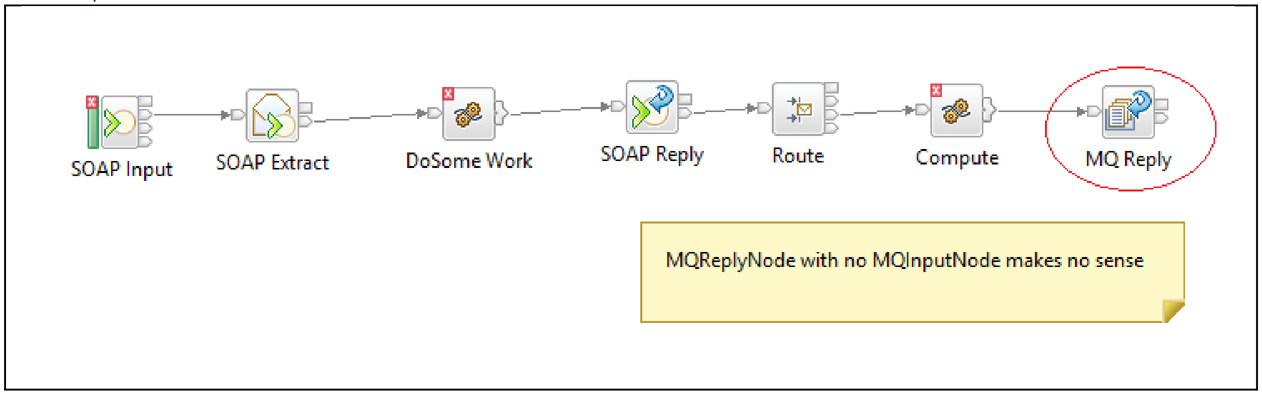
### References:
NA

## Rule: Flow contains an MQReplyNode without an MQInputNode

### Sonar Rule: R96

### Rational:
MQReplyNode does not match to an MQInputNode, you can only reply to an incoming message.

Example:



MQReplyNode with no MQInputNode makes no sense

Preferred:

NA

References:

NA

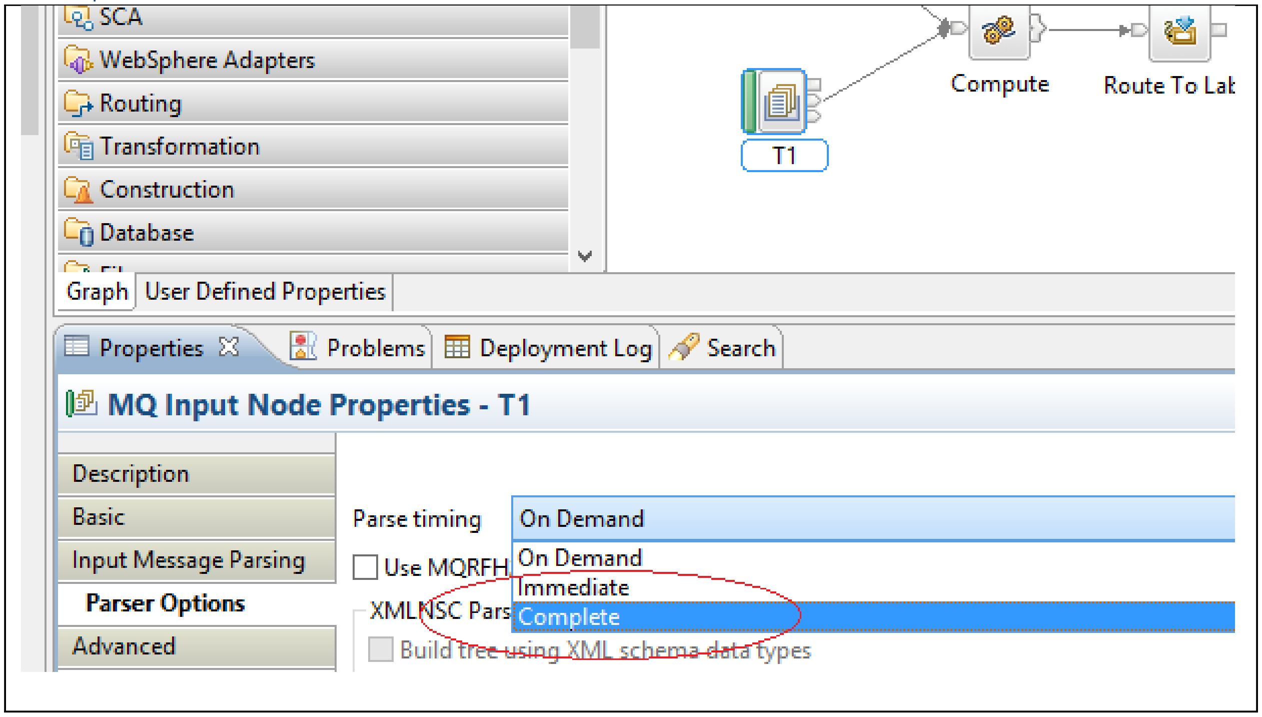
Rule: InputNode parse timing is not set to 'complete'

Sonar Rule: R67

Rational:

Enabling 'Complete' input parsing allows the whole message to processed/validated at the start, so failure can happen as early as possible.

Example:



Parse timing: On Demand

On Demand
Immediate
Complete

Preferred:

NA

References:

NA

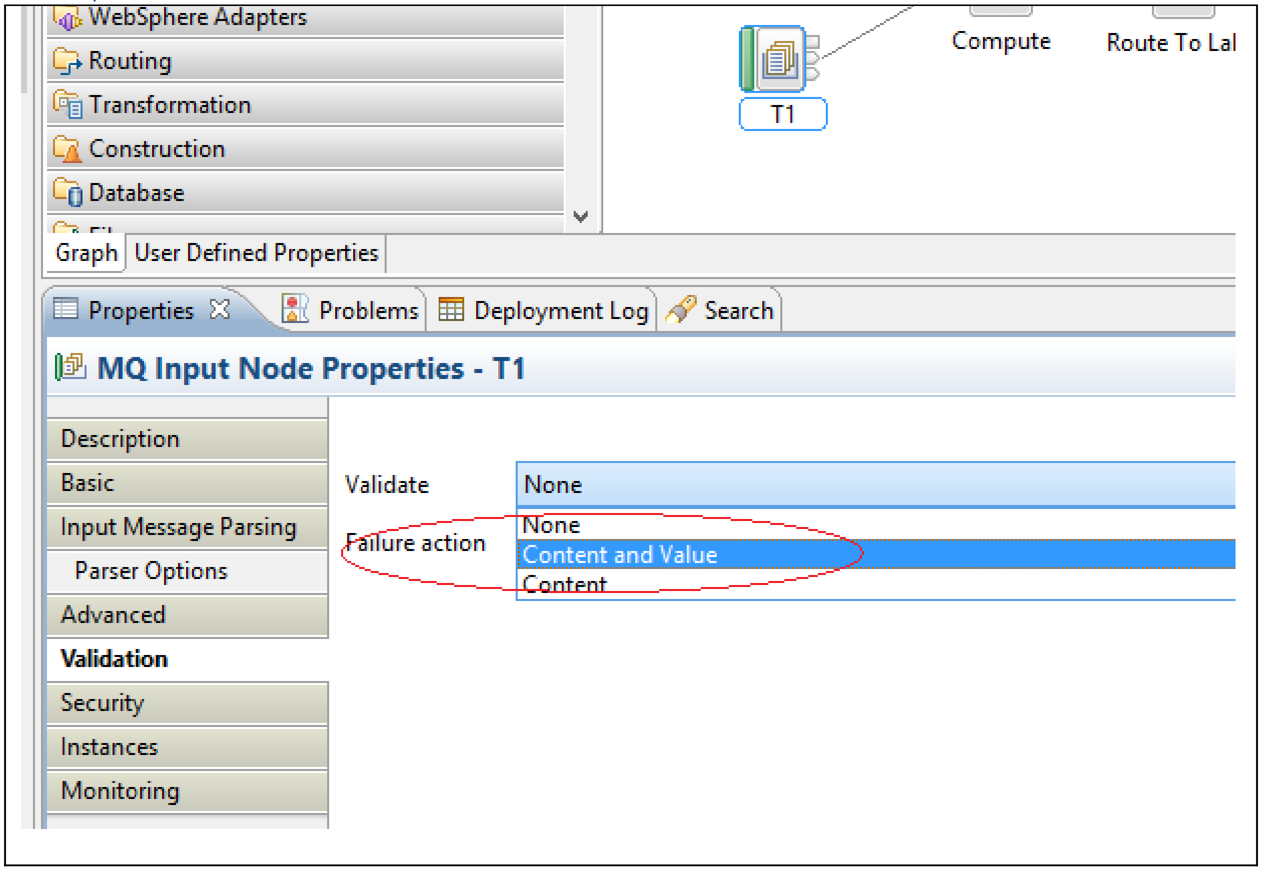
## Rule: InputNode validation is not set to 'content and value'

## Sonar Rule: R68

Rational:

Enabling 'Content and Value' validation allows the whole message to processed/validated at the start, so failure can happen as early as possible.

Example:



MQ Input Node Properties - T1

Validate: None

Failure action

None

Content and Value

Content

Preferred:

NA

References:

NA

## Rule: The filter node may only have one return value

### Sonar Rule: R91

#### Rational:

Filter nodes that only have 1 return are not providing filtering to more then one available path.
A filter node with a single return could be either a logic error or could be redundant.

#### Example:

```
CREATE FILTER MODULE Flow2_Filter
        CREATE FUNCTION Main() RETURNS BOOLEAN
        BEGIN
                SET OutputRoot.XMLNSC.Response.details.person.age = '20';
                RETURN FALSE;
        END;
END MODULE;
```

#### Preferred:

Check that a filter node is required.

#### References:

NA

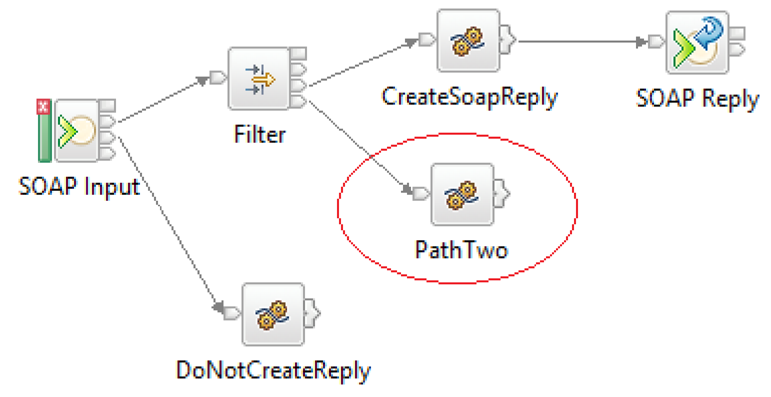
## Rule: The message flow does not consistently reply to messages/requests

### Sonar Rule: R65

#### Rational:

This rule checks that when using a request reply pattern, either with SOAP, HTTP or MQ, if one path through the code replies, then all paths through the code reply.
In the case of MQ, if a client is expecting a response and the flow doesn't always return one, then the consumer is blocking/waiting potentially indefinately. SOAP and HTTP responses will time out, but that also may cause issues for service consumers.

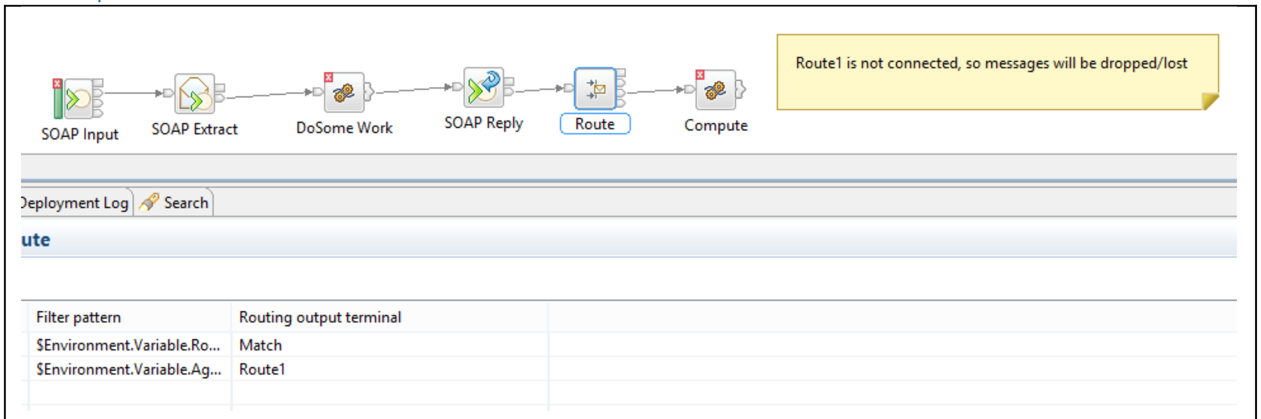
#### Example:



### Preferred:
Check that each path, even the error paths have a valid reply.

### References:
http://www.ibm.com/developerworks/websphere/library/techarticles/0910_philliips/0910_phillips.html

## Rule: The routing nodes connections and filters may not be consistant
### Sonar Rule: R62
### Rational:
Routing nodes have a table of allowed exits (routes), if the routes and the connected outputs don't match, this could indicate a logical error.

### Example:


Route1 is not connected, so messages will be dropped/lost

| Filter pattern | Routing output terminal |
|---|---|
| $Environment.Variable.Ro... | Match |
| $Environment.Variable.Ag... | Route1 |

### Preferred:
Check the route table against the connections attached.
### References:
NA

## Rule: The queue name defined may not be compliant (length, case, underscores, starts with SYSTEM., blanks, short names)
### Sonar Rule: R59
### Rational:
Queue names can be created that function successfully in one environment configuration but fail or work differently in another. This check suggests when a queue name isn't following a consistent naming practice, or has a name that may be problematic in different environments (OS/version issues)

Example:

Queue names such as :

| Queue Name | Reason |
|---|---|
| **A** | should be discouraged as they are short and meaningless |
| **SYSTEM.xxx** | could conflict with broker runtime queues |

Preferred:

Work towards a consistent queue naming convention.

References:

NA

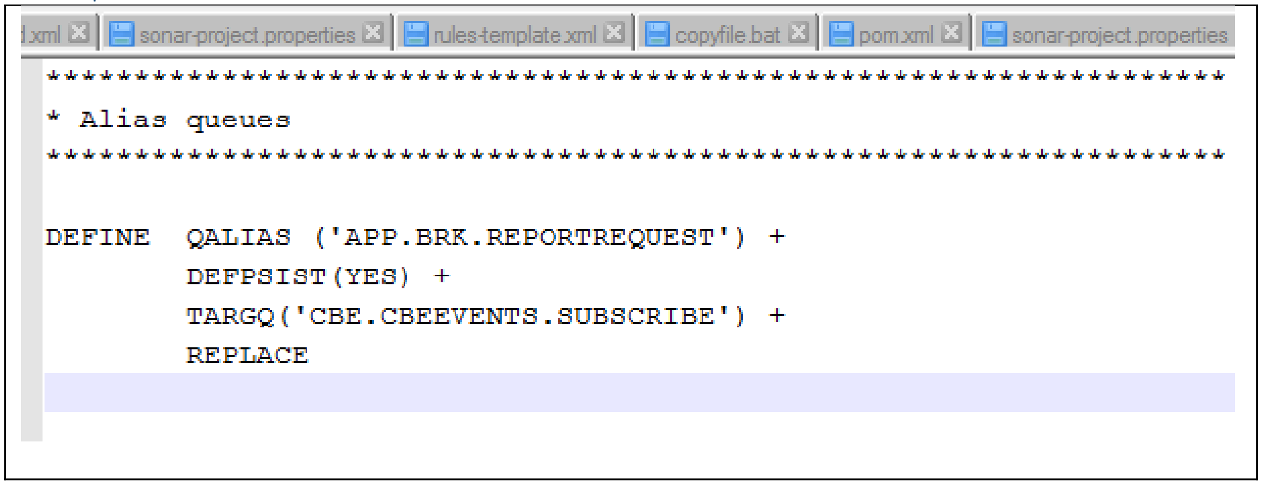
## Rule: The queue definition is missing a description

### Sonar Rule: R113

Rational:

Queues should have a description of what they are used for.

Example:



```
**********************************************************************
* Alias queues
**********************************************************************

DEFINE  QALIAS ('APP.BRK.REPORTREQUEST') +
        DEFPSIST(YES) +
        TARGQ('CBE.CBEEVENTS.SUBSCRIBE') +
        REPLACE
```

Preferred:

Add a description to the MQ Object creation scripts.

References:

NA

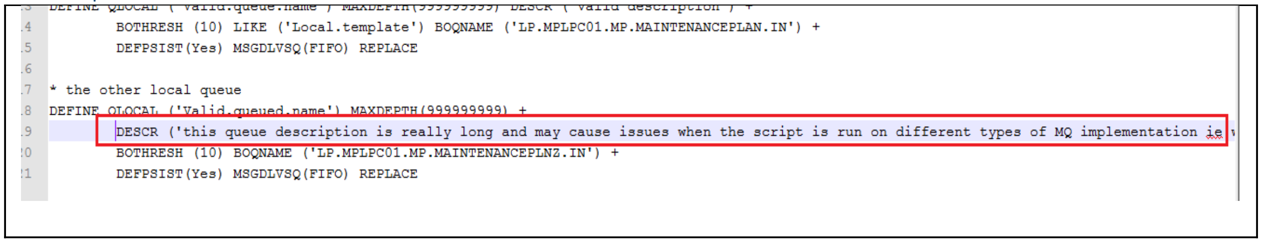
## Rule: The queue definition should be less then 100 characters

## Sonar Rule: R117

### Rational:

Queues should have a description of less than 100 characters

### Example:



```
DEFINE QLOCAL ('Valid.queue.name') MAXDEPTH(999999999) DESCR ('Valid description') +
        BOTHRESH (10) LIKE ('Local.template') BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLAN.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE

* the other local queue
DEFINE QLOCAL ('Valid.queued.name') MAXDEPTH(999999999) +
        DESCR ('this queue description is really long and may cause issues when the script is run on different types of MQ implementation ie
        BOTHRESH (10) BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLNZ.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE
```

### Preferred:

Limit the description to less then 100 characters.

### References:

NA

## Rule: The listener name does not match the pattern

## Sonar Rule: R118

### Rational:

MQ Listeners should match the naming pattern.

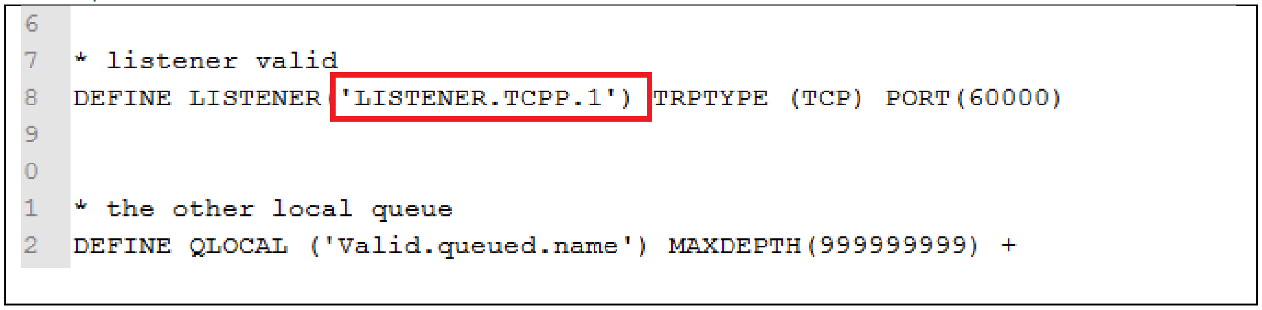
LISTENER.TCP.

LISTENER.LU62.

LISTENER.NETBIOS.

LISTENER.SPX.

### Example:



```

* listener valid
DEFINE LISTENER ('LISTENER.TCPP.1') TRPTYPE (TCP) PORT(60000)


* the other local queue
DEFINE QLOCAL ('Valid.queued.name') MAXDEPTH(999999999) +
```

### Preferred:

NA

### References:

NA

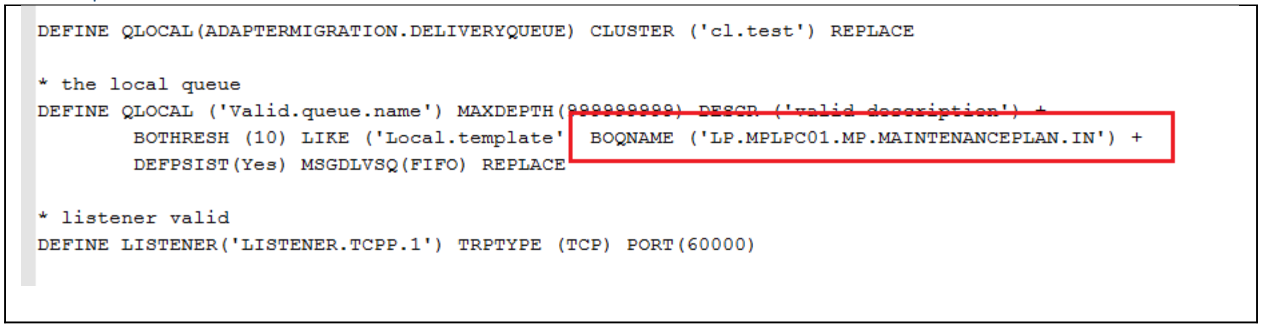
## Rule: The backout queue name does not match the pattern *.BACKOUT

## Sonar Rule: R119

### Rational:

BOQNames should follow a naming standard.

### Example:



```
DEFINE QLOCAL(ADAPTERMIGRATION.DELIVERYQUEUE) CLUSTER ('cl.test') REPLACE

* the local queue
DEFINE QLOCAL ('Valid.queue.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) LIKE ('Local.template')  BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLAN.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE

* listener valid
DEFINE LISTENER('LISTENER.TCPP.1') TRPTYPE (TCP) PORT(60000)
```

### Preferred:

NA

### References:

NA

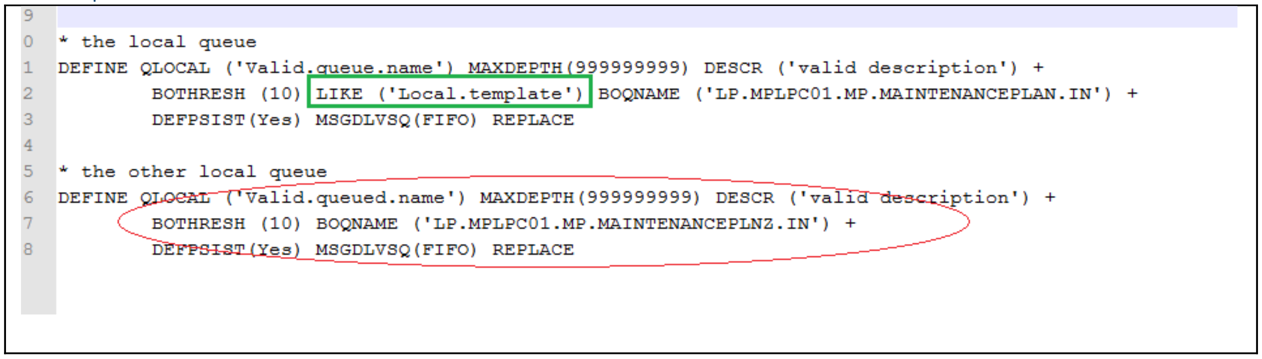
## Rule: The queue definition should be based on a template queue

## Sonar Rule: R114

### Rational:

Queues should be based on template queues.

### Example:



```
* the local queue
DEFINE QLOCAL ('Valid.queue.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) LIKE ('Local.template') BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLAN.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE

* the other local queue
DEFINE QLOCAL ('Valid.queued.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLNZ.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE
```

### Preferred:

NA

### References:

NA

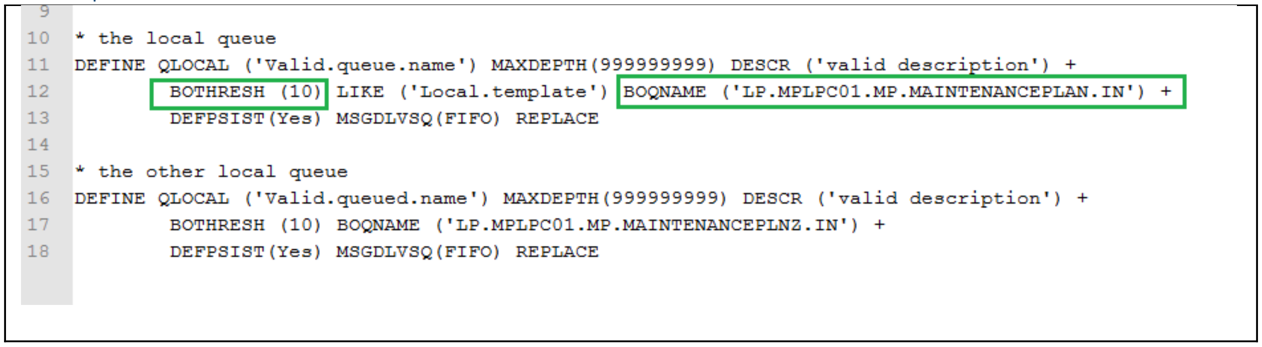
## Rule: The queue backout configuration is missing

### Sonar Rule: R115

### Rational:

Queues should have both a BOQNAME and BOTHRESH

### Example:



```
* the local queue
DEFINE QLOCAL ('Valid.queue.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) LIKE ('Local.template') BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLAN.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE

* the other local queue
DEFINE QLOCAL ('Valid.queued.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLNZ.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE
```

### Preferred:

NA

### References:

NA

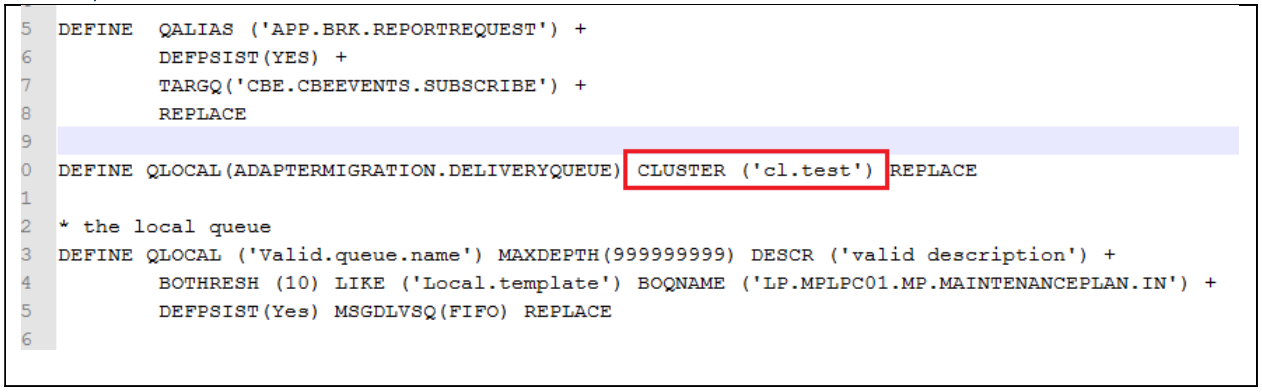
## Rule: The queue is set to clustered

### Sonar Rule: R116

### Rational:

Some organisation prefer to use non clustered queues

### Example:



```
DEFINE  QALIAS ('APP.BRK.REPORTREQUEST') +
        DEFPSIST(YES) +
        TARGQ('CBE.CBEEVENTS.SUBSCRIBE') +
        REPLACE

DEFINE QLOCAL(ADAPTERMIGRATION.DELIVERYQUEUE) CLUSTER ('cl.test') REPLACE

* the local queue
DEFINE QLOCAL ('Valid.queue.name') MAXDEPTH(999999999) DESCR ('valid description') +
        BOTHRESH (10) LIKE ('Local.template') BOQNAME ('LP.MPLPC01.MP.MAINTENANCEPLAN.IN') +
        DEFPSIST(Yes) MSGDLVSQ(FIFO) REPLACE
```

### Preferred:

NA

### References:

NA

## Rule: The code may be referring a to field that is not part of the MQMD header definition (and may be ignored)

### Sonar Rule: R57

#### Rational:

When ESQL interacts with a message, there is no tyype safe checking that you would get with a struct in C or an Object in Java.
This check indicates that a field is being accessed that doesn't exist and will be ignored.

#### Example:

```
SET OutputRoot.MQMD.StrucIdx = 'abc';
```

#### Preferred:

Check against valid/allowed MQMD header fields.

```
SET OutputRoot.MQMD.StrucId = 'abc';
```

#### References:

NA

## Rule: The LOOP may not have a valid LEAVE statement (and may not exit validly)

### Sonar Rule: R56

#### Rational:

An infinite loop within ESQL code will cause the execution group (EG) to stop responding/hang.
This violation indicates that an infinite loop can occur.

#### Example:

```
DETAILS_LOOP : LOOP
        SET details = Environment.Variables.Details;
        IF COALESCE(details,'') = '' THEN
                -- use in testing
        END IF;
END LOOP DETAILS_LOOP;
```

#### Preferred:

Check the exit conditions:

```
DETAILS_LOOP : LOOP
        SET details = Environment.Variables.Details;
        IF COALESCE(details,'') = '' THEN
                -- use in testing
                LEAVE DETAILS_LOOP;
        END IF;
END LOOP DETAILS_LOOP;
```

## References:

NA

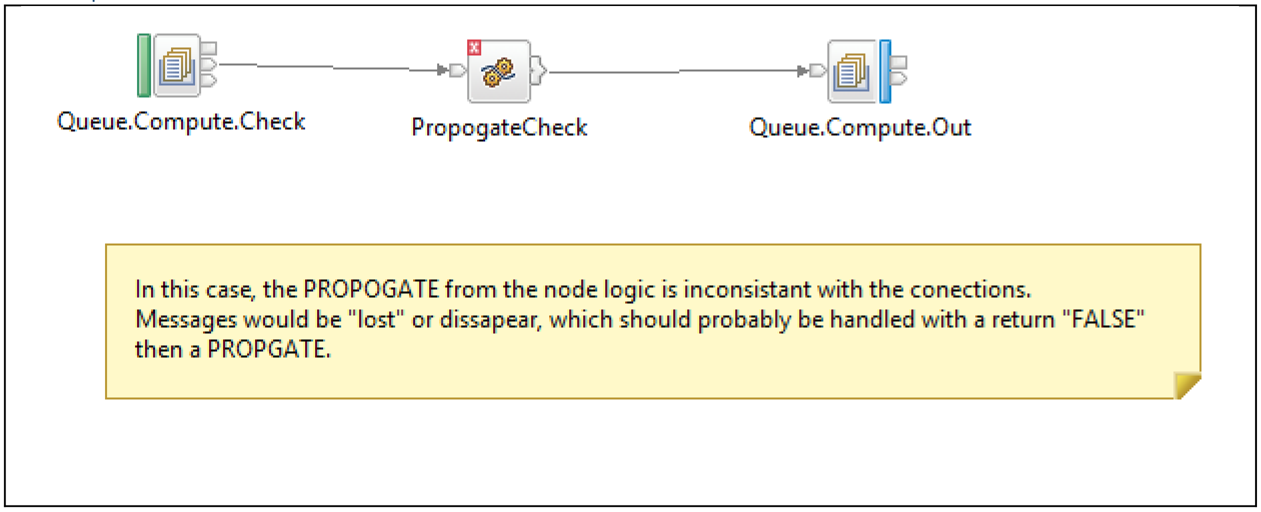
## Rule: The compute nodes connections are inconsistent

### Sonar Rule: R55

### Rational:

There is a logical coupling of a compute node and its connections to the ESQL code that is executed when it runs. This violation indicates that there is an inconsistent state between the ESQL logic and compute node configuration.

### Example:



In this case, the PROPOGATE from the node logic is inconsistant with the conections. Messages would be "lost" or dissapear, which should probably be handled with a return "FALSE" then a PROPGATE.

```
CREATE FUNCTION Main() RETURNS BOOLEAN
BEGIN
        CALL CopyMessageHeaders();
        CALL CopyEntireMessage();

        IF (Environment.Variables.Person.Sex = 'Male') THEN
                PROPAGATE TO TERMINAL 'out1';
        ELSE
                PROPAGATE TO TERMINAL 'out2' DELETE NONE;
        END IF;
        DECLARE details CHARACTER;
        RETURN TRUE;
END;
```

### Preferred:

Check that the paths through the node match the ESQL PROPOGATE statements.

### References:

NA

## Rule: The date format may not be correct

### Sonar Rule: R54

### Rational:

The plugin attempts to scan the date formatting used in the ESQL and determine whether the format is valid.

### Example:

```
RETURN CAST(dateAsChar AS DATE FORMAT 'dd/MMMMM/yy');
```

### Preferred:

Check the date format is valid.

### References:

NA

## Rule: The filter node may not have its connections connected correctly

### Sonar Rule: R52

### Rational:

There is a logical coupling of a filter node and its connections to the ESQL code that is executed when it runs. This violation indicates that there is an inconsistent state between the ESQL logic and filter node.

### Example:

```
CREATE FILTER MODULE Flow2_Filter
        CREATE FUNCTION Main() RETURNS BOOLEAN
        BEGIN
                RETURN TRUE;
        END;
END MODULE;
```

The ESQL logic above for the filter node never returns unknown or true, so doesn't make logical sense.

### Preferred:

Check that filter node and the ESQL are consistent.

### References:

NA

## Rule: The filter node cannot modify the message

### Sonar Rule: R53

### Rational:

The message tree is immutable when a filter node runs. Any attempts to write to the message tree will be ignored and are treated as a logic error.

### Example:

```
CREATE FILTER MODULE Flow2_Filter
        CREATE FUNCTION Main() RETURNS BOOLEAN
        BEGIN
                SET OutputRoot.XMLNSC.Response.details.person.age = '20';
                RETURN FALSE;
        END;
END MODULE;
```

### Preferred:

Check that filter node and the ESQL are consistent.

### References:

NA

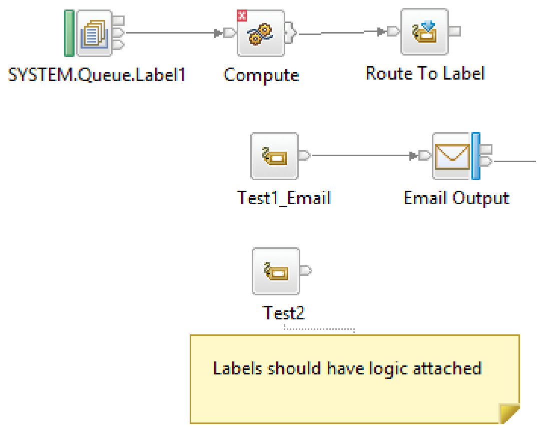
## Rule: Label has no associated processing logic attached

## Sonar Rule: R50

### Rational:

When Message Broker jumps to an empty label, the processing stops at a dead end. This could indicate a logic issue. For example, if this is done as part of a SOAP Request/Reply pattern, then the flow will never return a response.

### Example:



### Preferred:

Check that labels with no processing attached are logically valid.

### References:

NA

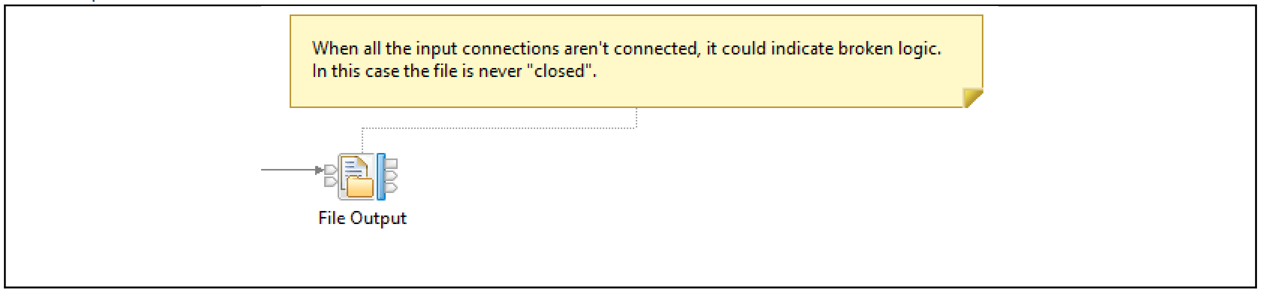
## Rule: Not all input nodes connected. Resources may not be processed correctly

### Sonar Rule: R51

### Rational:

Some nodes require multiple inputs to function correctly. These include the FileOutput node (where the using flow needs to close the file),  the Aggregation node that requires a message to indicate that aggregation can be completed.
When these terminals aren't connected, it could be an indication of a logic error.

### Example:


When all the input connections aren't connected, it could indicate broken logic.
In this case the file is never "closed".

In this case, the file is never closed.

### Preferred:

Check that flows in question are configured according to how they are being used.

### References:

NA

## Rule: TODO has been left in the comments

### Sonar Rule: R43

### Rational:

"TODO" that has been left in the code could either be an issue around code maturity, or could indicate business logic or an algorithim that hasn't been completed.

### Example:

```
// TODO complete the last name check with the special case of 66 year olds
IF (Env.Person.LastName IS NULL) THEN
        IF (Env.Person.FirstName IS NOT NULL) THEN
                SET Env.Message.Out = 'Wow, you have done well';
                SET Env.Message.NextValue = '10';
        ELSEIF (Env.Person.Age > 99) THEN
                SET Env.Message.Out = 'Wow, you are almost there';
                SET Env.Message.NextValue = '9';
        END IF;
END IF;
```

### Preferred:

Check the logic and either complete the logic or remove the comment.

### References:

http://checkstyle.sourceforge.net/config_misc.html#TodoComment

## Rule: Code is unreachable following a RETURN or THROW statement

### Sonar Rule: R40

### Rational:

Code that follows a RETURN or THROW cannot be running. This can either suggest dead code or a logic error.

### Example:

The login in the line highlighted below will not be executed.

```
IF (Env.Person.LastName IS NULL) THEN
        IF (Env.Person.FirstName IS NOT NULL) THEN
                SET Env.Message.Out = 'Wow, you have done well';
                SET Env.Message.NextValue = '10';
        ELSEIF (Env.Person.Age > 99) THEN
                SET Env.Message.Out = 'Wow, you are almost there';
                SET Env.Message.NextValue = '9';
        END IF;
END IF;
RETURN;
SET Env.Message.Flag.Ignored = 'TRUE';
```

### Preferred:

Check the logic and either move or remove the affected code.

### References:

NA

## Rule: The PASSTHRU statement parameters and values don't match

### Sonar Rule: R33

### Rational:

The plugin matches the parameters to the structure passed into the PASSTHRU function. This allows the plugin to make sure that the SQL code is consistent and with its parameters.

### Example:

```
SET LocalEnvironment.Variables.SelectData[] = PASSTHRU('SELECT * ' ||
                                'FROM THEDATA.PersonTable WHERE Age = ?');
```

### Preferred:

Analyse the SQL and the parameters to make sure that they are consistent.

### References:
NA

## Rule: Node refers to an empty main method. Either code has been left out or the node can be removed from the flow

### Sonar Rule: R30

### Rational:
When a compute node is added to a message flow, it is created with a matching ESQL procedure. This violation indicates that a node has been added but no ESQL code has been attached. This node is essentially not performing any function and can be removed. It could also indicate that the node should have logic added, which has been missed by the developer.

### Example:
```
CREATE COMPUTE MODULE Flow5_Compute
	CREATE FUNCTION Main() RETURNS BOOLEAN
	BEGIN
		RETURN TRUE;
	END;

	CREATE PROCEDURE CopyMessageHeaders() BEGIN
		DECLARE I INTEGER 1;
		DECLARE J INTEGER;
		SET J = CARDINALITY(InputRoot.*[]);
		WHILE I < J DO
			SET OutputRoot.*[I] = InputRoot.*[I];
			SET I = I + 1;
		END WHILE;
	END;

	CREATE PROCEDURE CopyEntireMessage() BEGIN
		SET OutputRoot = InputRoot;
	END;
END MODULE;
```

### Preferred:
Either add code the ESQL procedure or delete the node.

### References:
NA

## Rule: The input node has no failure handler connected. Errors may not be able to be tracked or may be lost

### Sonar Rule: R48
And

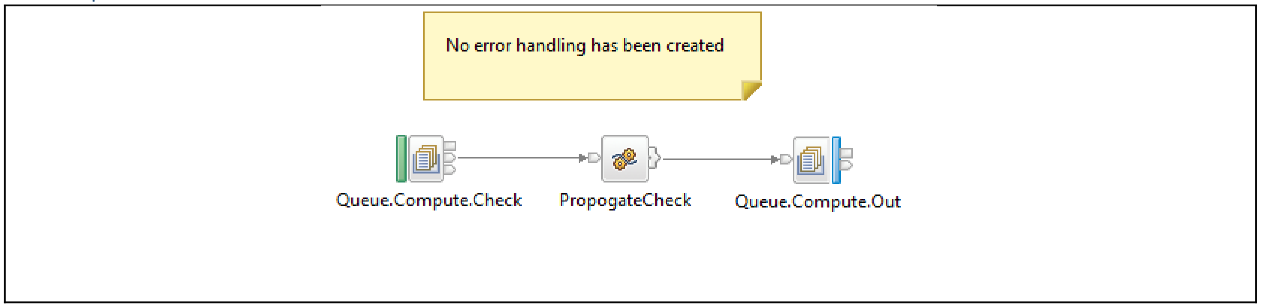
## Rule: The input node has no catch handler connected. Errors may not be able to be tracked or may be lost

### Sonar Rule: R71

### Rational:

If the first node in a flow has no failure handler, then errors may be lost depending upon how the input node is configured. Many MB users have default Error/Failure flows that they make use of.

### Example:



### Preferred:

Check that possible error conditions are taken into account in the design and are handled appropriately.

### References:

http://blogs.msdn.com/b/dotnet/archive/2009/02/19/why-catch-exception-empty-catch-is-bad.aspx

http://www.ibm.com/developerworks/library/j-jtp06294/

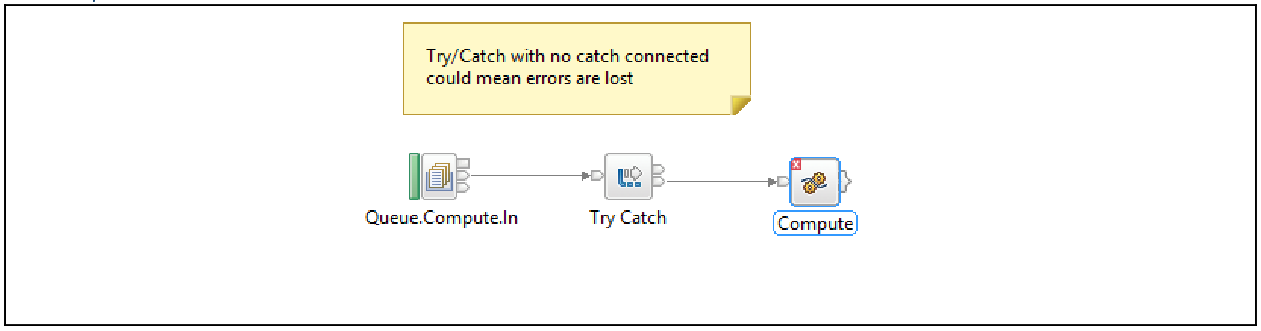
## Rule: Try/Catch no functional catch connected. May cause errors to be lost

### Sonar Rule: R25

### Rational:

Exception handlers prevent the default error handling for flows. For flows that consume messages, the default error handling to send the message to the appropriate dead letter queue, for flows consuming SOAP messages, the default error handling to return a fault.
Try/catch handlers with no catch result in the error being silently swallowed, which in most cases can cause the loss of information, such as the contents of a business message.

### Example:


Try/Catch with no catch connected could mean errors are lost
Queue.Compute.In
Try Catch
Compute

### Preferred:
Look to add an exception handler or remove the Try/Catch node.

### References:
http://blogs.msdn.com/b/dotnet/archive/2009/02/19/why-catch-exception-empty-catch-is-bad.aspx

http://www.ibm.com/developerworks/library/j-jtp06294/

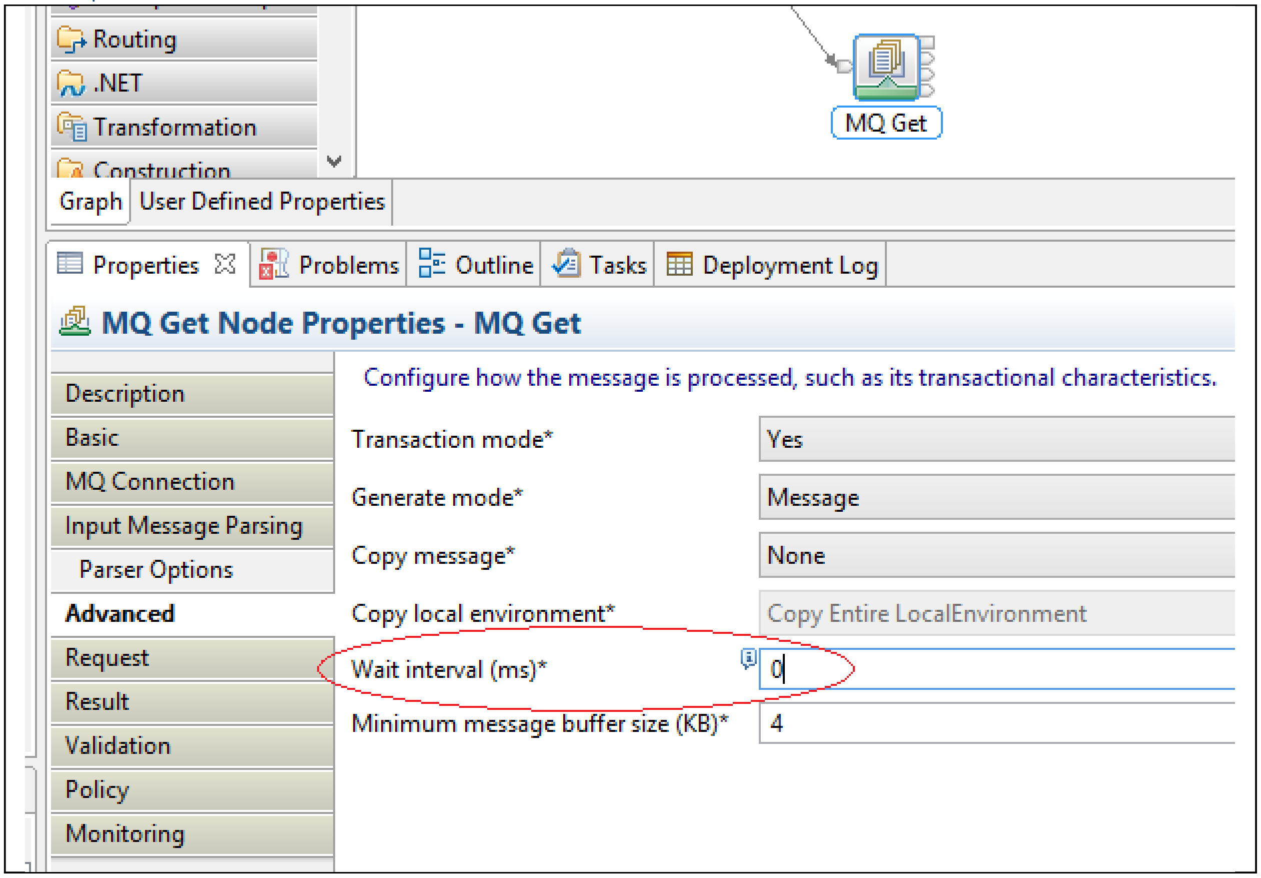
## Rule: Atomic references atomic
## Sonar Rule: R17
### Rational:
ATOMIC sections of code mark critical sections that only one thread can enter at a time.
Nested calls to ATOMIC blocks of code could cause a dead lock where 2 independent threads are have created a dead lock situation.

### Example:
```
ATOMICROUTING : BEGIN ATOMIC -- beginning of atomic block
  CALL AtomicProcedure();
END ATOMICROUTING ; -- end of the atomic block

CREATE PROCEDURE AtomicProcedure() BEGIN
        EMBEDDEDATOMIC : BEGIN ATOMIC -- beginning of atomic block. Processing is single threaded
until the END; is reached
                SET OutputRoot.XMLNSC.SoapMessage.SoapBody.Person.Name = 'Fred';
        END EMBEDDEDATOMIC ; -- end of the ROUTING atomic block
END;
```

### Preferred:
Analyse and refactor code to prevent possible dead lock situations.
### References:
NA

## Rule: MQGet node has an infinite timeout set.
## Sonar Rule: R99
### Rational:
The MQGet node has an infinite timeout set. This may cause flows to never complete if the requested message is not available

Example:



MQ Get Node Properties - MQ Get

Configure how the message is processed, such as its transactional characteristics.

| | |
|---|---|
| Transaction mode* | Yes |
| Generate mode* | Message |
| Copy message* | None |
| Copy local environment* | Copy Entire LocalEnvironment |
| Wait interval (ms)* | 0 |
| Minimum message buffer size (KB)* | 4 |

Preferred:

Set a timeout or use a seperate flow to receive the response and continue the process.

References:

NA

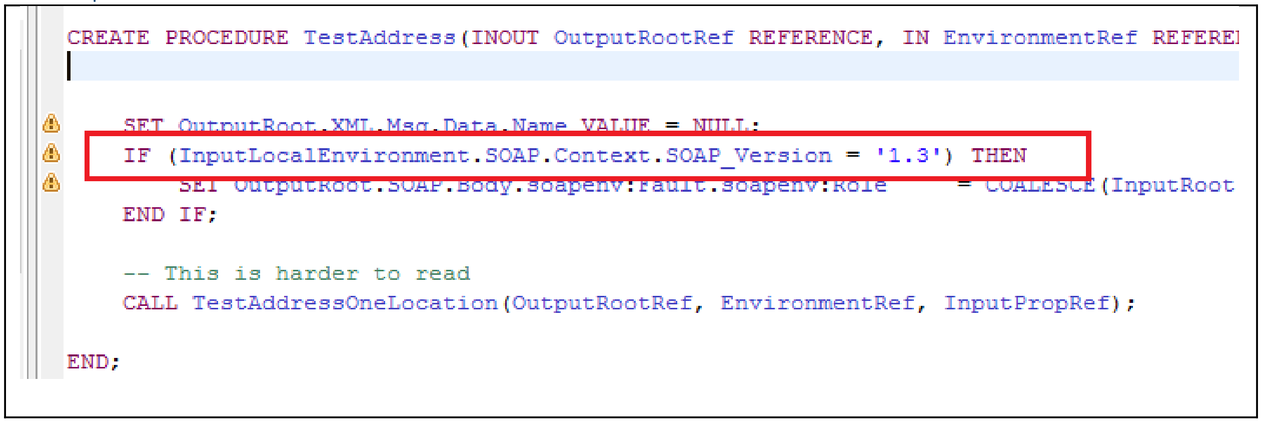
## Rule: The SOAP version should be 1.1 or 1.2

## Sonar Rule: R173

Rational:

SOAP version used should be 1.1 or 1.2.

Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFERE


    SET OutputRoot.XML.Msg.Data.Name VALUE = NULL;
    IF (InputLocalEnvironment.SOAP.Context.SOAP_Version = '1.3') THEN
        SET OutputRoot.SOAP.Body.soapenv:Fault.soapenv:Role      = COALESCE(InputRoot
    END IF;

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:

NA

References:

NA

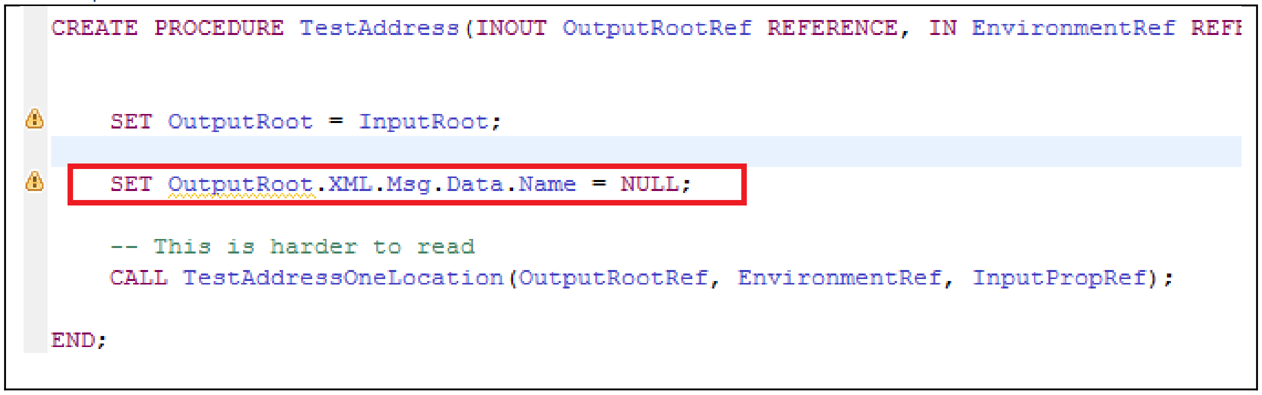
## Rule: Assigning field to NULL deletes the field from the output

Sonar Rule: R174

Rational:

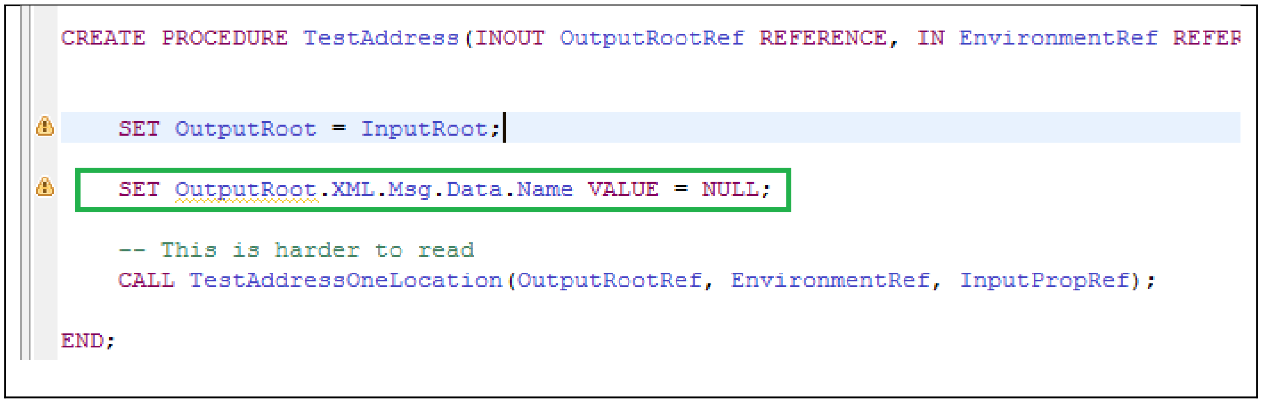
Assigning to NULL will delete the field in the output, did you want to set the field to empty instead?

Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFE


    SET OutputRoot = InputRoot;

    SET OutputRoot.XML.Msg.Data.Name = NULL;

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:


```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFER

    SET OutputRoot = InputRoot;

    SET OutputRoot.XML.Msg.Data.Name VALUE = NULL;

    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

References:

NA

## Rule: The message domain may be invalid

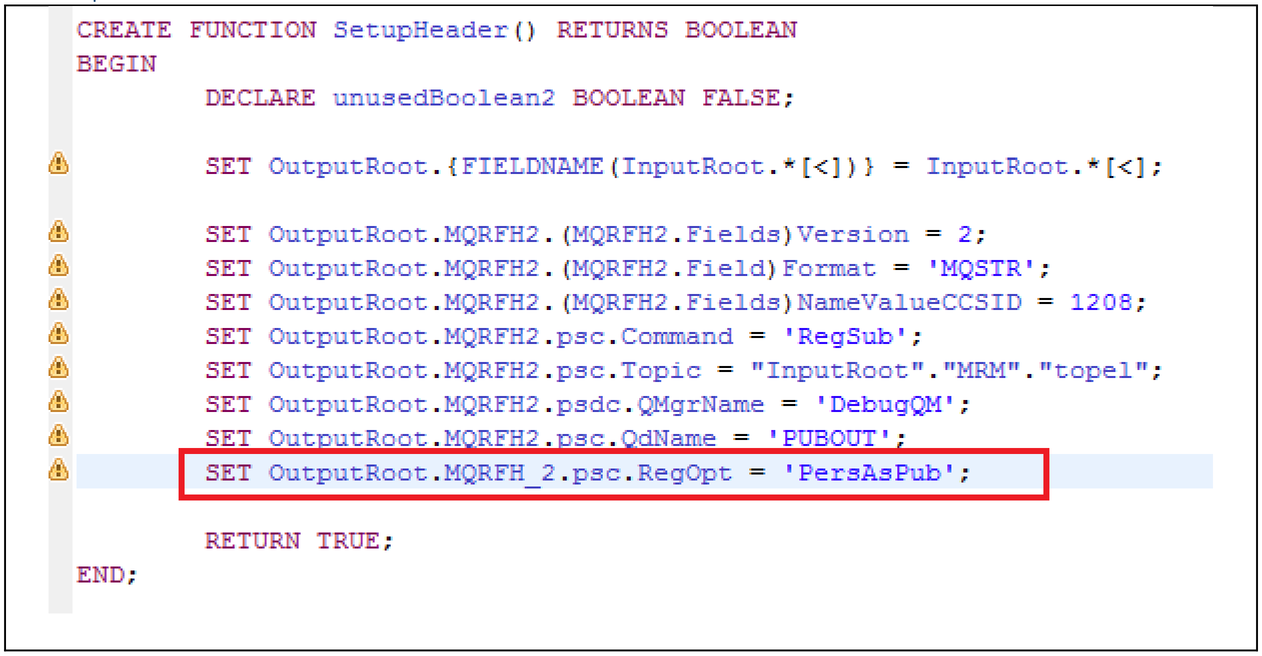
Sonar Rule: R175

Rational:

The message domain may be invalid. Not one of the following:

MQMD
SOAP
XML
XMLNSC
BLOB
JSON
MRM

Example:



```
CREATE FUNCTION SetupHeader() RETURNS BOOLEAN
BEGIN
        DECLARE unusedBoolean2 BOOLEAN FALSE;

        SET OutputRoot.{FIELDNAME(InputRoot.*[<])} = InputRoot.*[<];

        SET OutputRoot.MQRFH2.(MQRFH2.Fields)Version = 2;
        SET OutputRoot.MQRFH2.(MQRFH2.Field)Format = 'MQSTR';
        SET OutputRoot.MQRFH2.(MQRFH2.Fields)NameValueCCSID = 1208;
        SET OutputRoot.MQRFH2.psc.Command = 'RegSub';
        SET OutputRoot.MQRFH2.psc.Topic = "InputRoot"."MRM"."topel";
        SET OutputRoot.MQRFH2.psdc.QMgrName = 'DebugQM';
        SET OutputRoot.MQRFH2.psc.QdName = 'PUBOUT';
        SET OutputRoot.MQRFH_2.psc.RegOpt = 'PersAsPub';

        RETURN TRUE;
END;
```

Preferred:

NA

References:

NA

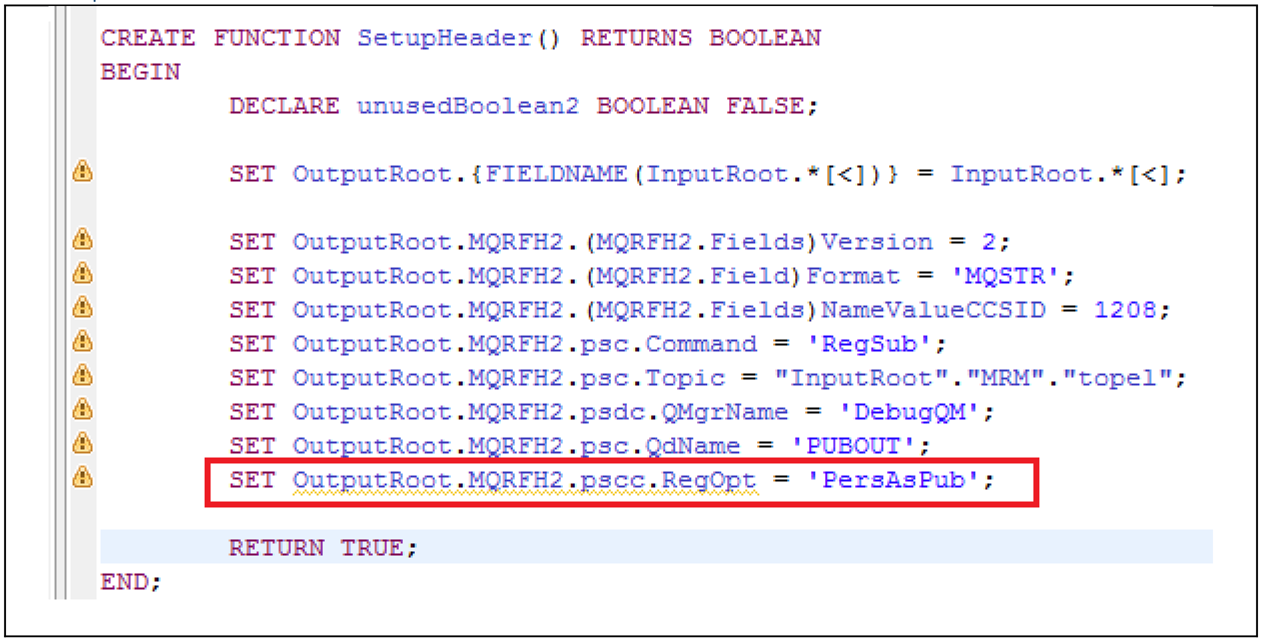
## Rule: The child element in the domain may not be valid

## Sonar Rule: R176

Rational:

The child element in that domain may not be valid.

Example:



```
CREATE FUNCTION SetupHeader() RETURNS BOOLEAN
BEGIN
        DECLARE unusedBoolean2 BOOLEAN FALSE;

        SET OutputRoot.{FIELDNAME(InputRoot.*[<])} = InputRoot.*[<];

        SET OutputRoot.MQRFH2.(MQRFH2.Fields)Version = 2;
        SET OutputRoot.MQRFH2.(MQRFH2.Field)Format = 'MQSTR';
        SET OutputRoot.MQRFH2.(MQRFH2.Fields)NameValueCCSID = 1208;
        SET OutputRoot.MQRFH2.psc.Command = 'RegSub';
        SET OutputRoot.MQRFH2.psc.Topic = "InputRoot"."MRM"."topel";
        SET OutputRoot.MQRFH2.psdc.QMgrName = 'DebugQM';
        SET OutputRoot.MQRFH2.psc.QdName = 'PUBOUT';
        SET OutputRoot.MQRFH2.pscc.RegOpt = 'PersAsPub';

        RETURN TRUE;
END;
```

Preferred:

NA

References:

NA

## XSL processing

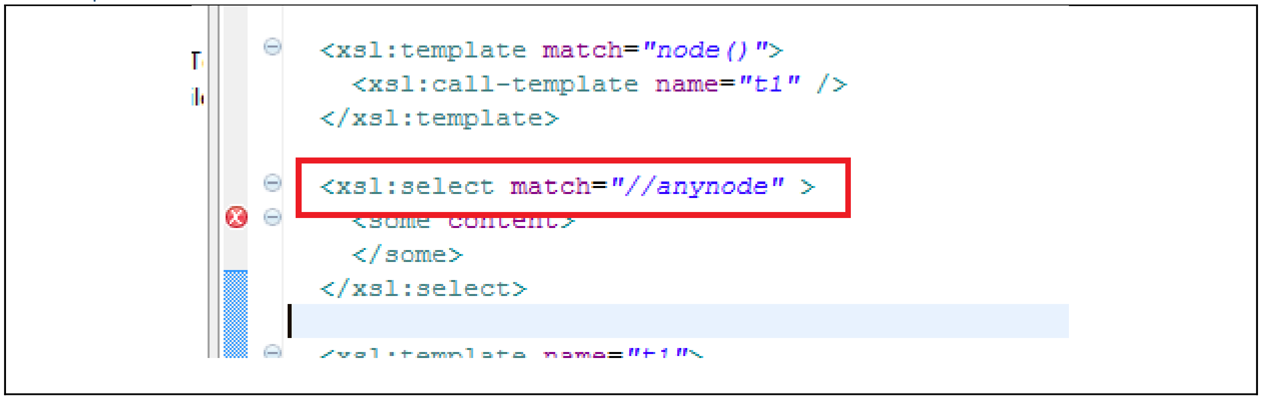
### Rule: XPATH contains //

### Sonar Rule: R146

#### Rational:

// Selects from anywhere in the document and may affect peformance

#### Example:



```
<xsl:template match="node()">
  <xsl:call-template name="t1" />
</xsl:template>

<xsl:select match="//anynode" >
  <some content>
  </some>
</xsl:select>

<xsl:template name="t1">
```

#### Preferred:

NA

#### References:

NA

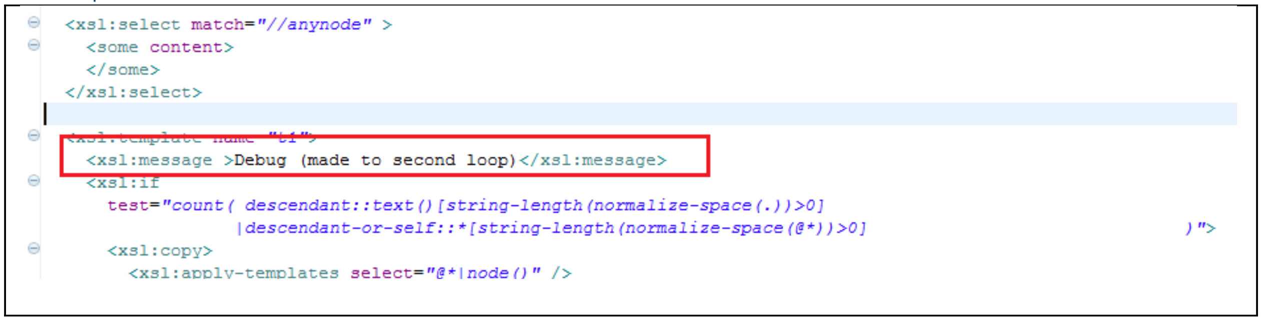
### Rule: XPATH contains <XSL:Message>

### Sonar Rule: R147

#### Rational:

<XSL:Message> could be left over debugging and are not usually left in production code.

#### Example:



```
<xsl:select match="//anynode" >
  <some content>
  </some>
</xsl:select>

<xsl:template name="t1">
  <xsl:message >Debug (made to second loop)</xsl:message>
  <xsl:if
    test="count( descendant::text()[string-length(normalize-space(.))>0]
                |descendant-or-self::*[string-length(normalize-space(@*))>0]                    )">
    <xsl:copy>
      <xsl:apply-templates select="@*|node()" />
```

#### Preferred:

NA

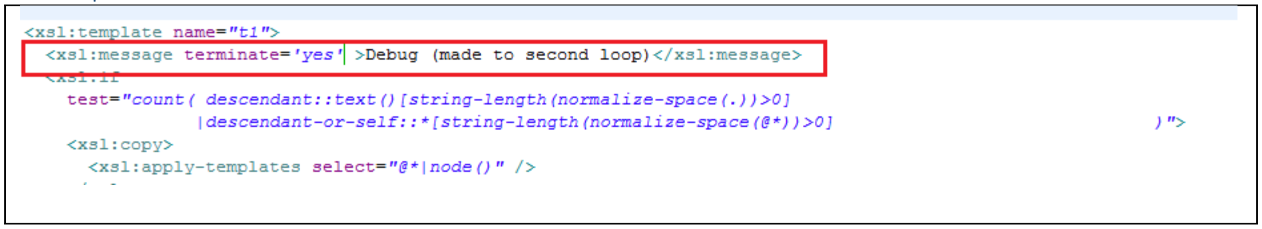
References:
NA

## Rule: XPATH contains <XSL:Message> with terminate set to 'YES'

### Sonar Rule: R148

Rational:
<XSL:Message terminate='yes'> could be left over debugging and are not usually left in production code.

Example:



```
<xsl:template name="t1">
  <xsl:message terminate='yes' >Debug (made to second loop)</xsl:message>
  <xsl:if
    test="count( descendant::text()[string-length(normalize-space(.))>0]
                |descendant-or-self::*[string-length(normalize-space(@*))>0]                )">
    <xsl:copy>
      <xsl:apply-templates select="@*|node()" />
```

Preferred:
NA

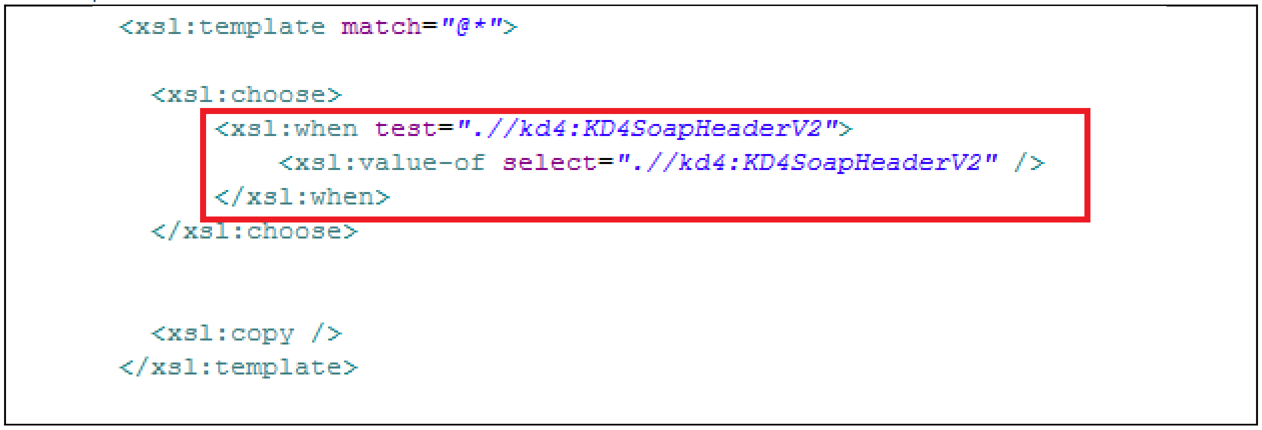
References:
NA

## Rule: <XSL:Choose> with only 1 condition could be replaced by an <xsl:if>

### Sonar Rule: R150

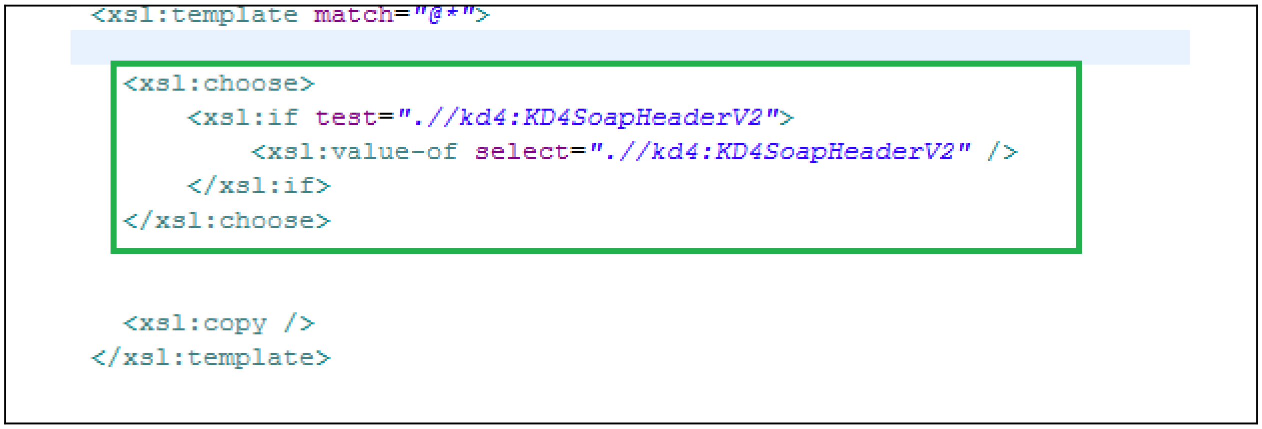
Rational:
<XSL:Choose> with only 1 condition could be replaced with an <XSL:If>.

Example:



```
<xsl:template match="@*">

  <xsl:choose>
      <xsl:when test=".//kd4:KD4SoapHeaderV2">
          <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
      </xsl:when>
  </xsl:choose>


  <xsl:copy />
</xsl:template>
```

Preferred:



```
<xsl:template match="@*">

  <xsl:choose>
      <xsl:if test=".//kd4:KD4SoapHeaderV2">
          <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
      </xsl:if>
  </xsl:choose>


  <xsl:copy />
</xsl:template>
```

References:

NA

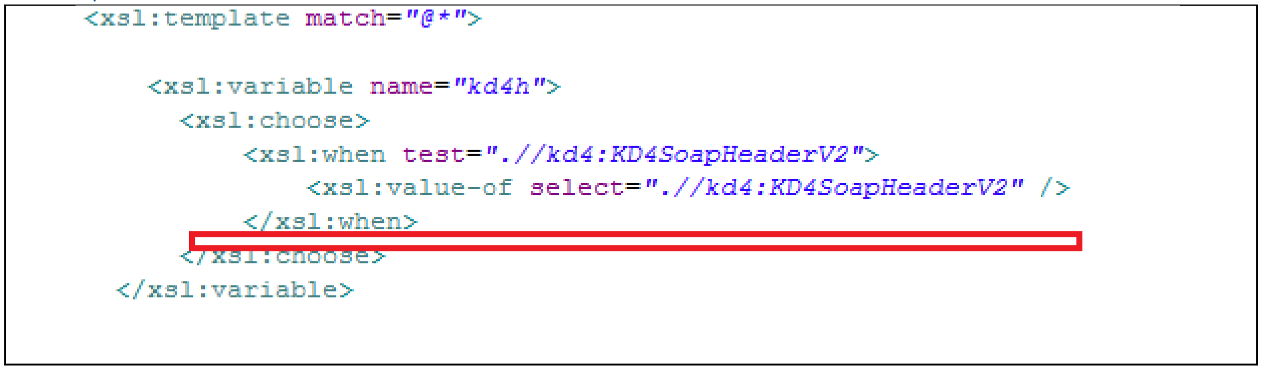
Rule: <XSL:Choose> missing <XSL:Otherwise>

Sonar Rule: R151

Rational:

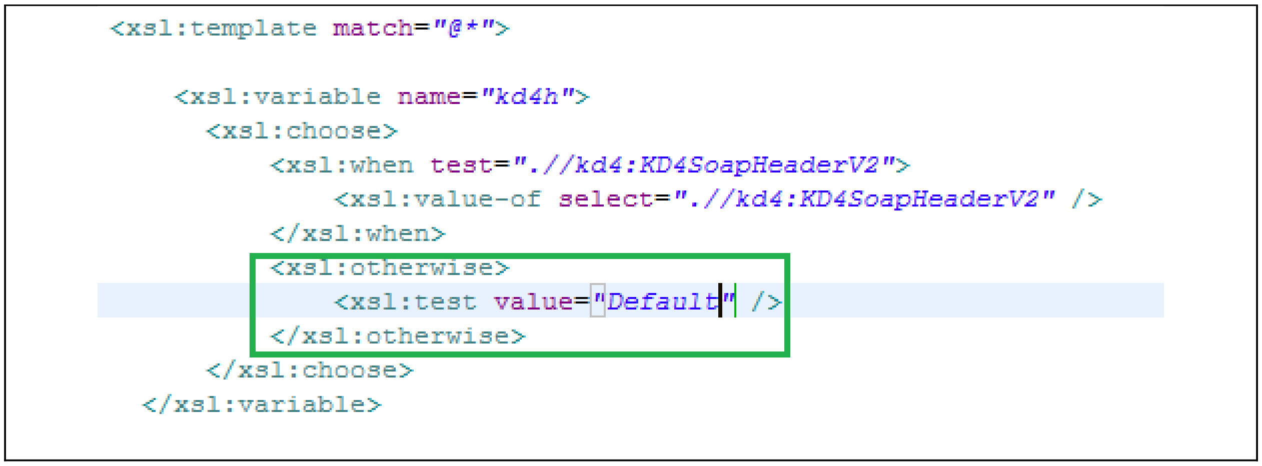
<XSL:Choose> should include a default <XSL:Otherwise> condition.

Example:



```
<xsl:template match="@*">

    <xsl:variable name="kd4h">
      <xsl:choose>
          <xsl:when test=".//kd4:KD4SoapHeaderV2">
              <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
          </xsl:when>
      </xsl:choose>
  </xsl:variable>
```

Preferred:



```
<xsl:template match="@*">

    <xsl:variable name="kd4h">
      <xsl:choose>
          <xsl:when test=".//kd4:KD4SoapHeaderV2">
              <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
          </xsl:when>
          <xsl:otherwise>
              <xsl:test value="Default" />
          </xsl:otherwise>
      </xsl:choose>
  </xsl:variable>
```

References:

NA

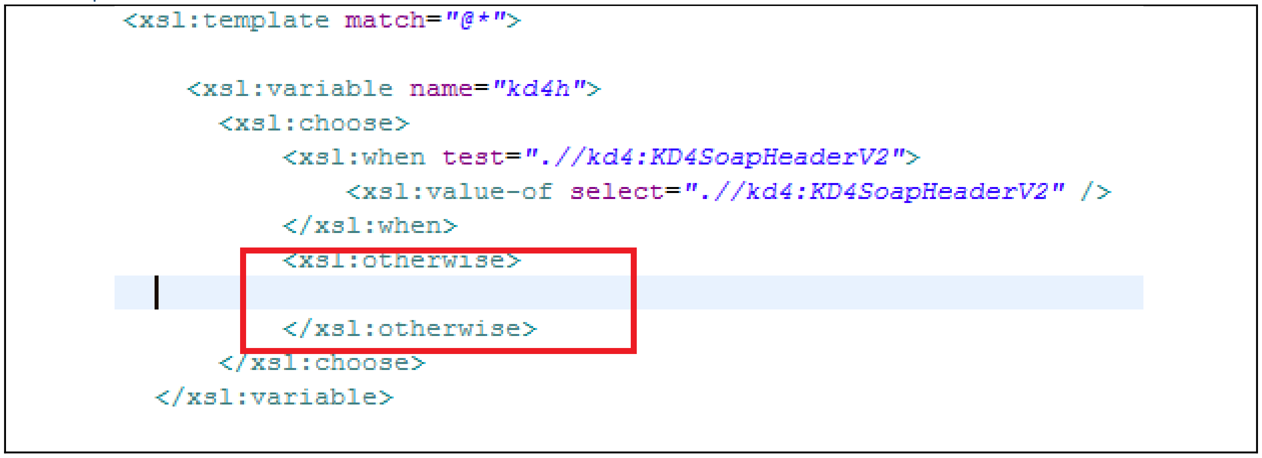
## Rule: <XSL:Otherwise> is empty

## Sonar Rule: R152

Rational:

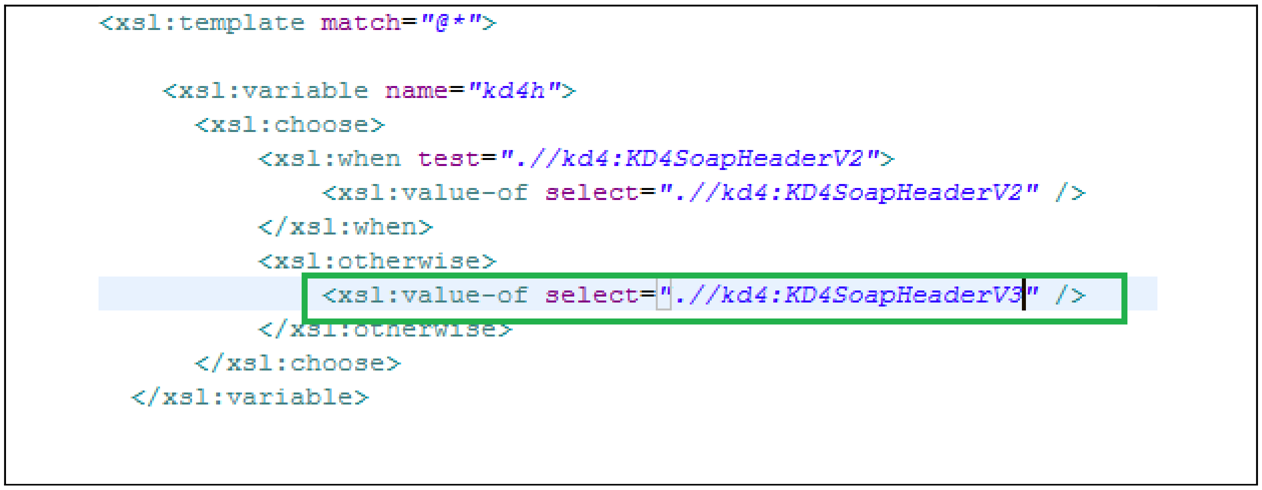
The default condition should be populated.

Example:



```
<xsl:template match="@*">

    <xsl:variable name="kd4h">
      <xsl:choose>
          <xsl:when test=".//kd4:KD4SoapHeaderV2">
              <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
          </xsl:when>
          <xsl:otherwise>

          </xsl:otherwise>
      </xsl:choose>
  </xsl:variable>
```

Preferred:



```
    <xsl:template match="@*">

        <xsl:variable name="kd4h">
          <xsl:choose>
              <xsl:when test=".//kd4:KD4SoapHeaderV2">
                  <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
              </xsl:when>
              <xsl:otherwise>
                  <xsl:value-of select=".//kd4:KD4SoapHeaderV3" />
              </xsl:otherwise>
          </xsl:choose>
      </xsl:variable>
```

References:

NA

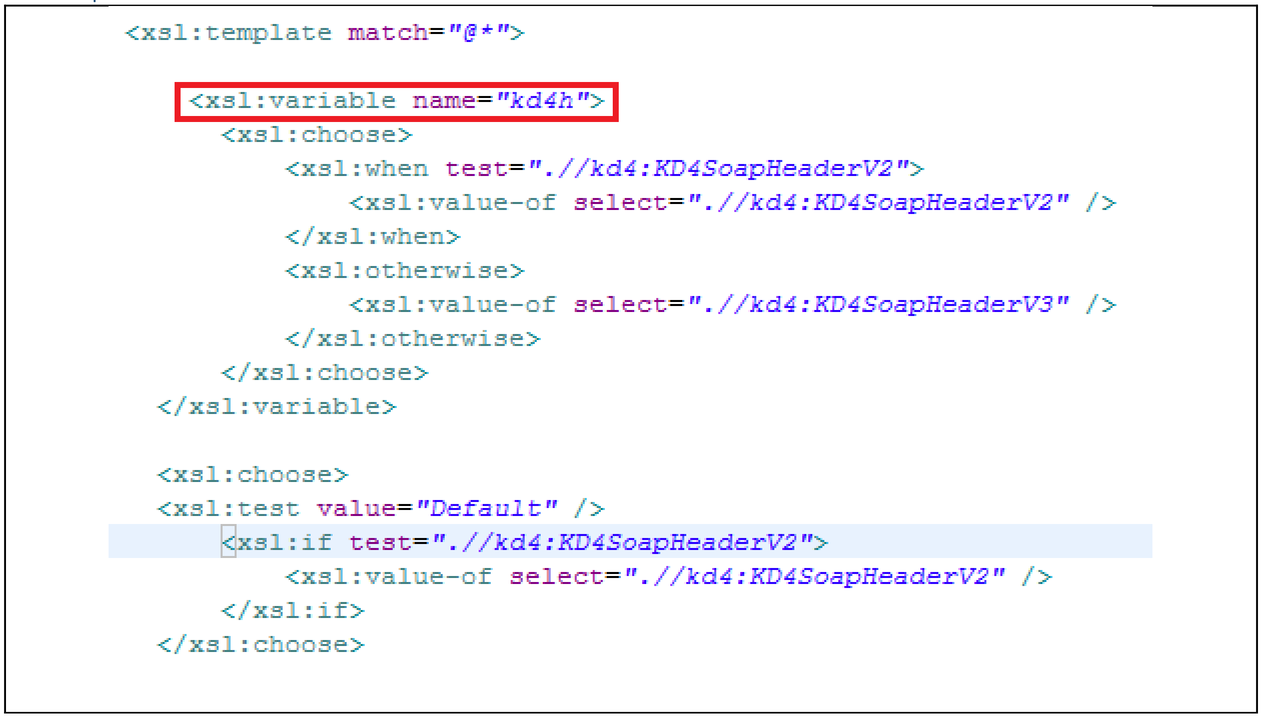
## Rule: <XSL:Variable> is declared but never used

## Sonar Rule: R159

Rational:

An XSL variable has been declared but never used. This could indicate a logic issue or may be code that can be cleaned up.

Example:



```
<xsl:template match="@*">

    <xsl:variable name="kd4h">
        <xsl:choose>
            <xsl:when test=".//kd4:KD4SoapHeaderV2">
                <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
            </xsl:when>
            <xsl:otherwise>
                <xsl:value-of select=".//kd4:KD4SoapHeaderV3" />
            </xsl:otherwise>
        </xsl:choose>
  </xsl:variable>

  <xsl:choose>
  <xsl:test value="Default" />
      <xsl:if test=".//kd4:KD4SoapHeaderV2">
          <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
      </xsl:if>
  </xsl:choose>
```

Preferred:

NA

References:

NA

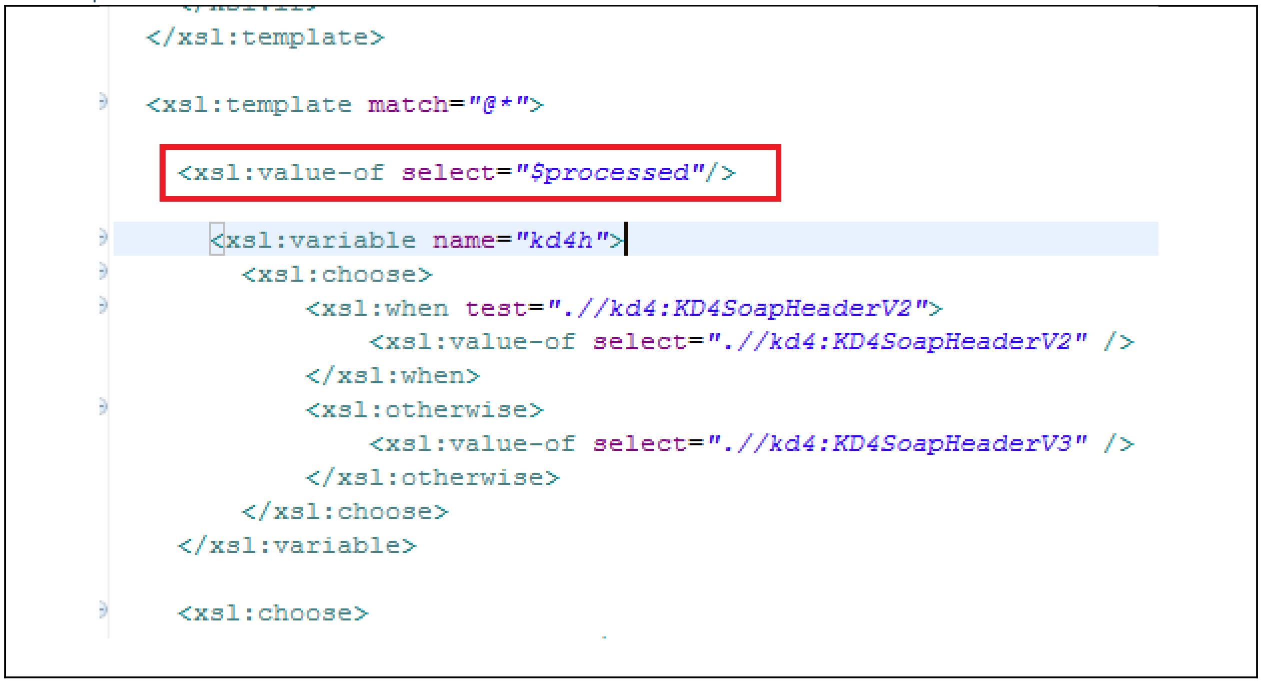
## Rule: <XSL:Variable> is used but never declared

## Sonar Rule: R160

Rational:

An XSL variable has been referenced but never declared. This will cause logic issues.

Example:



```
    </xsl:template>

    <xsl:template match="@*">

      <xsl:value-of select="$processed"/>

        <xsl:variable name="kd4h">
          <xsl:choose>
              <xsl:when test=".//kd4:KD4SoapHeaderV2">
                  <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
              </xsl:when>
              <xsl:otherwise>
                  <xsl:value-of select=".//kd4:KD4SoapHeaderV3" />
              </xsl:otherwise>
          </xsl:choose>
      </xsl:variable>

      <xsl:choose>
```

Preferred:

NA

References:

NA

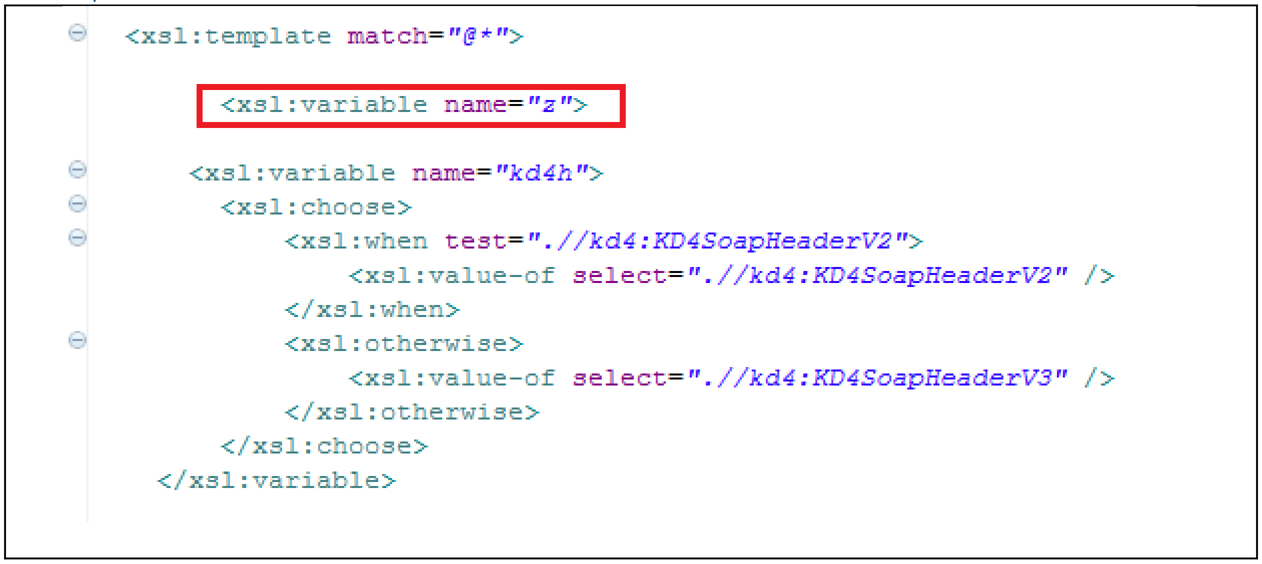
## Rule: <XSL:Variable> name maybe be meaningless

## Sonar Rule: R163

Rational:

An XSL variable has been declared but its name is possibly meaningless.

Example:



```
<xsl:template match="@*">

      <xsl:variable name="z">

    <xsl:variable name="kd4h">
      <xsl:choose>
          <xsl:when test=".//kd4:KD4SoapHeaderV2">
              <xsl:value-of select=".//kd4:KD4SoapHeaderV2" />
          </xsl:when>
          <xsl:otherwise>
              <xsl:value-of select=".//kd4:KD4SoapHeaderV3" />
          </xsl:otherwise>
      </xsl:choose>
  </xsl:variable>
```

Preferred:

Choose an intention revealing name for all variables.

References:

NA

## Security checks

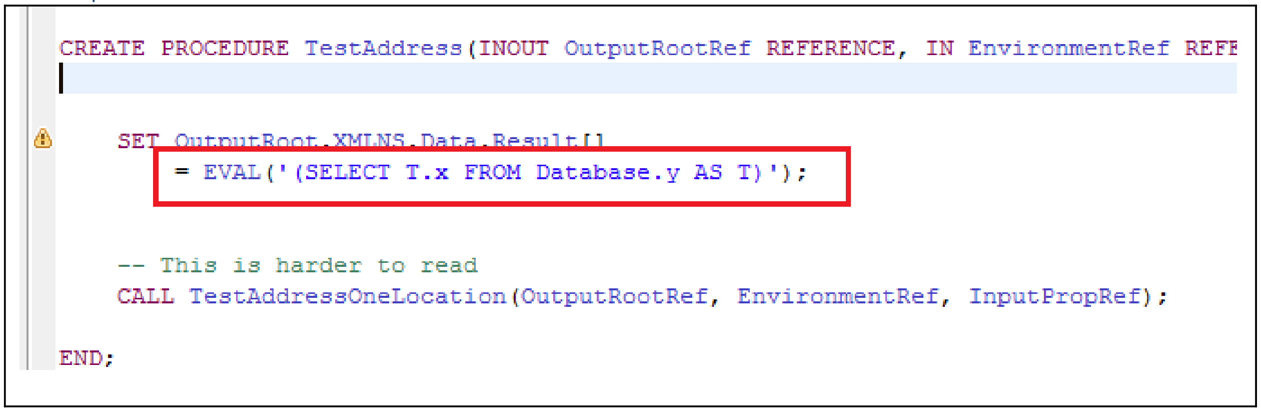
### Rule: Using EVAL may create a security issue

### Sonar Rule: R172

Rational:

EVAL statements could be used to inject malicious code.

Example:



```
CREATE PROCEDURE TestAddress(INOUT OutputRootRef REFERENCE, IN EnvironmentRef REFE


    SET OutputRoot.XMLNS.Data.Result[]
        = EVAL('(SELECT T.x FROM Database.y AS T)');


    -- This is harder to read
    CALL TestAddressOneLocation(OutputRootRef, EnvironmentRef, InputPropRef);

END;
```

Preferred:

Check all values being used or refctor EVAL out if possible.

References:

NA

## General coding best practices

### Rule: The condition is more complicated then the threshold

### Sonar Rule: R92

#### Rational:

Complicated IF and WHILE conditions are difficult to read and understand.
The current threshold is 3.

#### Example:

```
IF (Person.Age = 20) AND (Person.Sex = 'M') AND (Person.Heighht > 1029) OR (Person.Weight = 50)
THEN
```

#### Preferred:

Refactor conditions to be more readable.

#### References:

NA

### Rule: The function or procedure is longer than the threshold

### Sonar Rule: R29

#### Rational:

Long methods are generally harder to understand and maintain then shorted methods.
The threshold for when a violation occurs is controlled by the property “sonar.mb.esql.functionsize” in the sonar.properties file. The default value is “50”.

#### Example:

NA

#### Preferred:

Look at whether some of the code can be refactored into logical blocks. Analyse in conjuction with the CPD (copy paste detection) to see if some of the code can be provided by a common procedures.

#### References:

http://sourcemaking.com/refactoring/long-method

### Rule: Cyclomatic Complexity is higher then the threshold

### Sonar Rule: R28

#### Rational:

Cyclometric complexity is one measure of how complex a procedure/function is.
The threshold for when a violation occurs is controlled by the property “sonar.mb.esql.complexity” in the sonar.properties file. The default value is “10”.

Example:

```
CREATE FUNCTION Main() RETURNS BOOLEAN
BEGIN
        CALL CopyMessageHeaders();
        -- CALL CopyEntireMessage();
        SET Environment.Variables.P1.Name = OutputRoot.XMLNSC.Request.Person.Name;
        SET Environment.Variables.P1.Age = OutputRoot.XMLNSC.Request.Person.Age;
        SET Environment.Variables.P1.PostCode = OutputRoot.XMLNSC.Request.Person.PostCode;
        SET Environment.Variables.P1.FirstName = OutputRoot.XMLNSC.Request.Person.FirstName;
        SET Environment.Variables.P1.LastName = OutputRoot.XMLNSC.Request.Person.LastName;

        IF (Environment.Variables.P1.Age <> 20) then
                SET Environment.Variables.P1.StudentCard = 'TRUE';
        ELSE
                IF (Environment.Variables.P1.Age = 65) THEN
                        SET Environment.Variables.P1.PenionCard = 'FALSE';
                END IF;

                IF (LENGTH(OutputRoot.XMLNSC.Request.Person.PostCode) > 4) THEN
                        IF (NOT CONTAINS(OutputRoot.XMLNSC.Request.Person.PostCode,'2612')
AND NOT ENDSWITH(OutputRoot.XMLNSC.Request.Person.PostCode,'2613')) THEN
                                SET OutputRoot.Test6.Local =
LEFT( OutputRoot.XMLNSC.Request.Person.PostCode, 4 );
                        ELSE
                                SET Environment.Variables.P1.PenionCard = 'UNKNOWN';
                        END IF;
                END IF;
        ELSE

                SET Environment.Variables.P1.PenionCard = 'UNKNOWN';
        END IF;
        CALL ComplicatedFunction(Environment.Variables.SomeValue);

        CALL Test_Duplications();
        SET LocalEnvironment.Variables.SelectData[] = PASSTHRU('SELECT * ' || 'FROM
THEDATA.PersonTable');
        RETURN TRUE;
END;
```

Preferred:

Procedures and functions should be simplified where possible.

References:

http://en.wikipedia.org/wiki/Cyclomatic_complexity

http://blogs.msdn.com/b/zainnab/archive/2011/05/17/code-metrics-cyclomatic-complexity.aspx http://weblambdazero.blogspot.com.au/2013/08/cyclomatic-complexity-why-long-methods.html

## Rule: Unused variable

## Sonar Rule: R5

### Rational:

Unused variables add complexity to your code and with no value. They waste developers time understanding code which is essentially dead code. They can also indicate a failure in an algorithim.

### Example:

NA

### Preferred:

Comment out unused variables and check that the code can still be build. Then delete them from the code so that there is less useless commenting.

### References:

NA

## Rule: Unused method

## Sonar Rule: R16

### Rational:

Unused methods add complexity to your code and with no value. They waste developers time understanding code which is essentially dead code. They can also indicate a failure in an algorithim.

### Example:

NA

### Preferred:

Comment out unused methods and check that the code can still be built and executed. Then delete the code so that there is less useless commenting.

### References:

NA

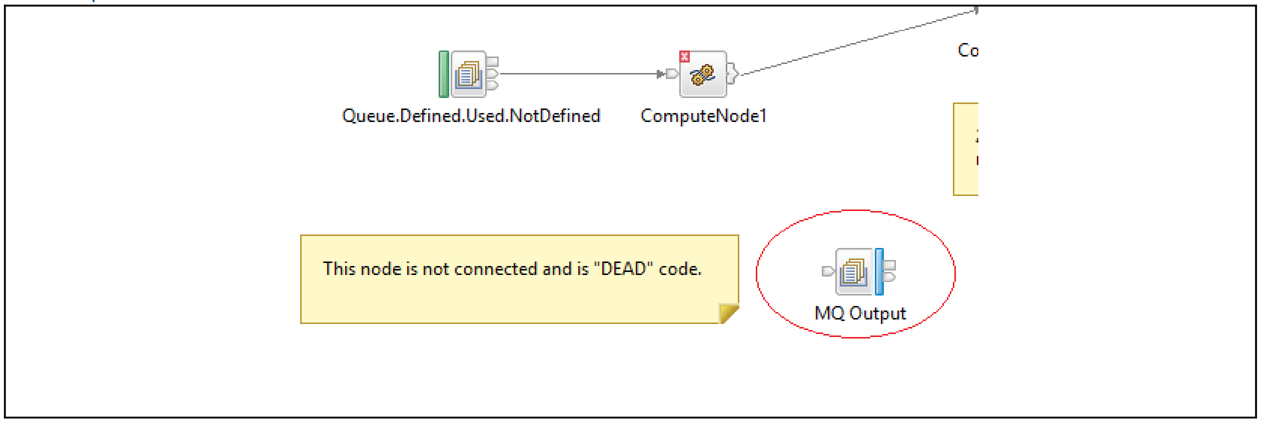
## Rule: There is no input connection to this node. The code may not be reachable or functioning

## Sonar Rule: R49

### Rational:

A flow may not be connected, and hence may not be invoked by the logic. This could mean that the whole flow is either incorrectly configured, which could cause logic errors, or is not required and is dead code, and can be removed.

Example:


Queue.Defined.Used.NotDefined
ComputeNode1
Co
This node is not connected and is "DEAD" code.
MQ Output

Preferred:

Delete any flows that are not required.

References:

NA

## Rule: A subflow has been created but is not being referenced. It may be able to be removed

Sonar Rule: R36

Rational:

Subflows are the logical equivalent of common procedures but for msgflow's. Subflows that are not referenced and are not required can be deleted to reduce confusion and improve clarity of the code.

Example:

NA

Preferred:

Delete the subflow that is not required.

References:

NA

## Rule: Source file is empty

Sonar Rule: R24

Rational:

Empty files have no function and should be cleaned up.

Example:

NA

### Preferred:

Delete empty files.

### References:

NA

## Other

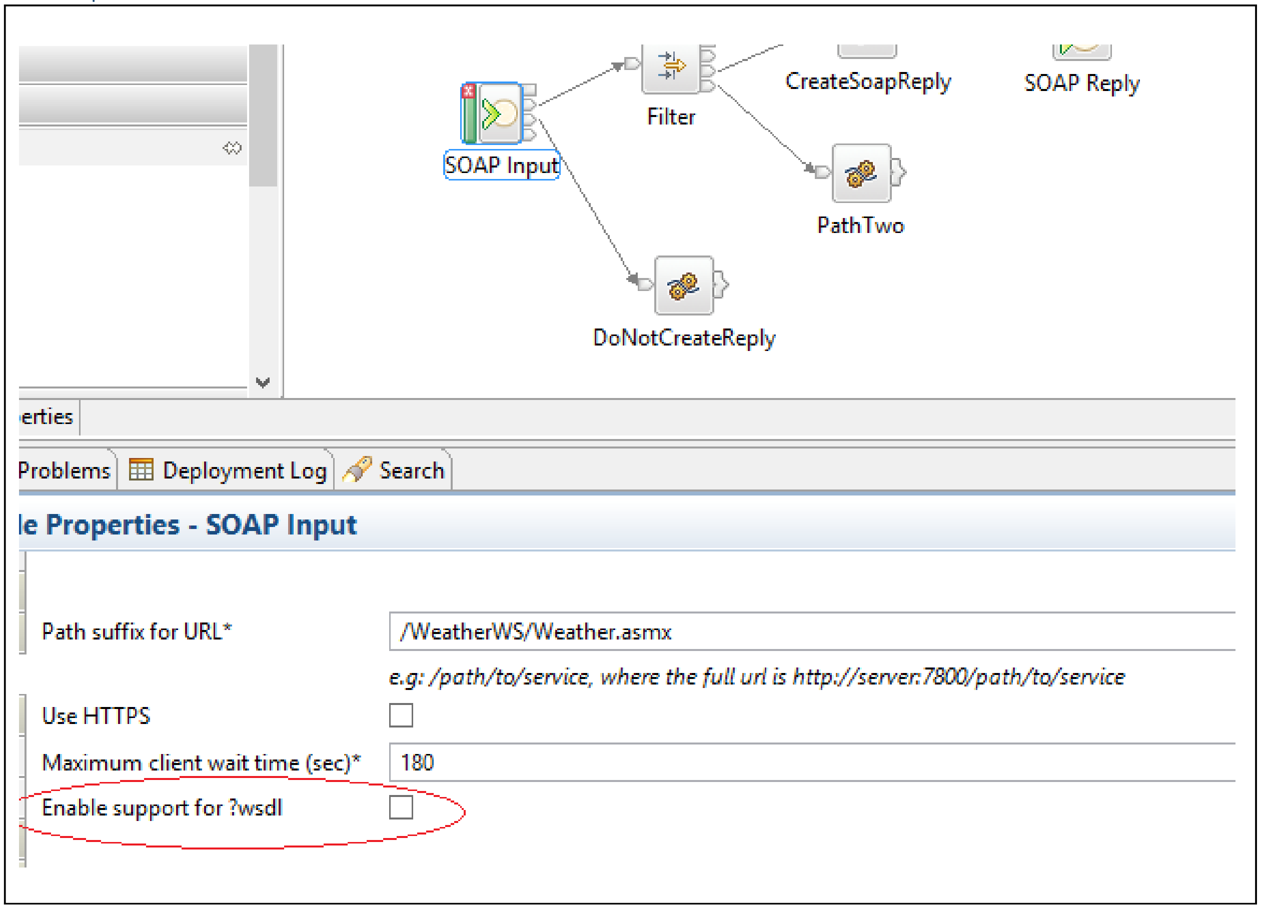
### Rule: SOAPInputNode does not have 'Enable support for ?wsdl checked'

### Sonar Rule: R66

#### Rational:

Enabling 'wsdl' support allows developers to extract information from deployed services to assist them in developing consuming services. For production systems that face the general public this may need to be turned off.

#### Example:



le Properties - SOAP Input

Path suffix for URL* /WeatherWS/Weather.asmx

*e.g: /path/to/service, where the full url is http://server:7800/path/to/service*

Use HTTPS ☐

Maximum client wait time (sec)* 180

Enable support for ?wsdl ☐

#### Preferred:

NA

#### References:

NA

## Rule: The message flow may not have been included in the deployment build scripts

### Sonar Rule: R63

#### Rational:

The plugin matches message flows against ant deployment/build scripts when available. If a flow is not in a deployment script, this could indicate that the script is incomplete or that the flow is dead/unused code and can be deleted.

#### Example:

Extract from build.xml

```
<exec executable="${create.bar.home}/mqsicreatebar" spawn="false">
        <arg value="-cleanBuild" />
        <arg value="-skipWSErrorCheck" />
        <arg value="-data" />
        <arg value="${env.WORKSPACE}" />
        <arg value="-b" />
        <arg value="${bar.name}" />
        <arg value="-p" />
        <arg value="Flow1a" />
        <arg value="TestServices" />
        <arg value="TestSchema" />
        <arg value="TestMessageSet" />
        <arg value="UtilityServices" />
        <arg value="-o" />
        <arg value="Flow1a.msgflow" />
        <arg value="TestProjectMessageSet/TestMessageSet/messageSet.mset" />
</exec>
```

#### Preferred:

Check the deployment scripts and flows match.

#### References:

NA

## Rule: Credentials are in plain text

### Sonar Rule: R18

#### Rational:

This indicates that credentials for authorisation/authentication have been setup in the code in plain text.

#### Example:

```
SET OutputRoot.Properties.IdentityMappedType = 'usernameAndPassword';
SET OutputRoot.Properties.IdentityMappedToken = 'xxx';
SET OutputRoot.Properties.IdentityMappedPassword = 'plaintextpassword';
SET OutputRoot.Properties.IdentityMappedIssuedBy = 'zz';
```

## Preferred:
They ideally should be replaced by a constant defined as an ‘EXTERNAL’ so that they can be replaced at deployment time using a broker override.

## References:
NA

## Documentation

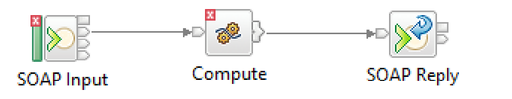
### Rule: Message flow does not contain a note

### Sonar Rule: R31

#### Rational:

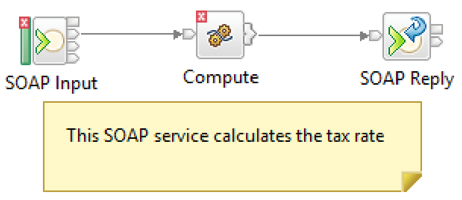
One option for documenting flows is to add a note to the msgflow. This rule when enabled indicates which flows don't have a documentation note.

#### Example:



#### Preferred:

Add documentation to each msgflow file.



#### References:

http://code.mycila.com/license-maven-plugin/

http://java.dzone.com/announcements/maven-2-license-plugin

### Rule: File does not contain header comments

### Sonar Rule: R20

#### Rational:

The plugin can check that a “standard” header has been added to the top of each ESQL file. This may be for ensuring SVN placeholders are in each file, a standard copyright message or any other standard documentation that might be useful. It mimics the Maven Licence plugin
It can be configured by setting the property *sonar.mb.header.company* in the sonar.properties file.

#### Example:

```
sonar.mb.header.company=Copyright Abc.co, 1997
```

### Preferred:
NA

### References:
http://code.mycila.com/license-maven-plugin/

http://java.dzone.com/announcements/maven-2-license-plugin

## Rule: File does not contain header comments
## Sonar Rule: R20
### Rational:
The plugin can check that a “standard” header has been added to the top of each ESQL file. This may be for ensuring SVN placeholders are in each file, a standard copyright message or any other standard documentation that might be useful. It mimics the Maven Licence plugin
It can be configured by setting the property *sonar.mb.header.company* in the sonar.properties file.

### Example:
```
sonar.mb.header.company=Copyright Abc.co, 1997
```

### Preferred:
NA

### References:
http://code.mycila.com/license-maven-plugin/

http://java.dzone.com/announcements/maven-2-license-plugin

## Rule: Header files should contain author, version and date
## Sonar Rule: R121
### Rational:
Having a standard place holder for author, version and date allows for improved documentation and better integration with tools such as SVN.

### Example:
```
/*
        Author: Test Coder
        Version: 1.0.1
        Date: 1/12/2015
*/
```

### Preferred:
NA

## References:

NA

## Specific usages

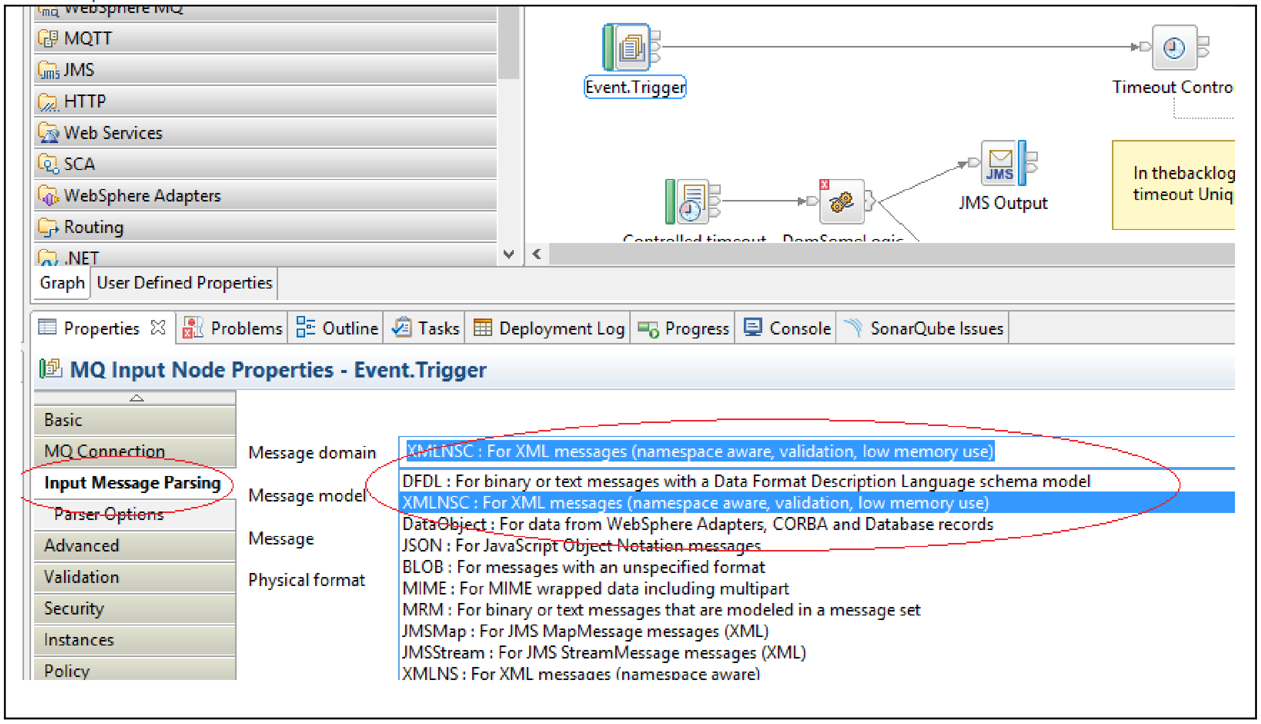
### Rule: MQInputNode domain should be XMLNSC

### Sonar Rule: R69

### Rational:

Some customers have a default standard of XMLNSC for all MQInput nodes.

### Example:



Message domain: XMLNSC : For XML messages (namespace aware, validation, low memory use)

Message model

Message

Physical format

DFDL : For binary or text messages with a Data Format Description Language schema model
XMLNSC : For XML messages (namespace aware, validation, low memory use)
DataObject : For data from WebSphere Adapters, CORBA and Database records
JSON : For JavaScript Object Notation messages
BLOB : For messages with an unspecified format
MIME : For MIME wrapped data including multipart
MRM : For binary or text messages that are modeled in a message set
JMSMap : For JMS MapMessage messages (XML)
JMSStream : For JMS StreamMessage messages (XML)
XMLNS : For XML messages (namespace aware)

### Preferred:

NA

### References:

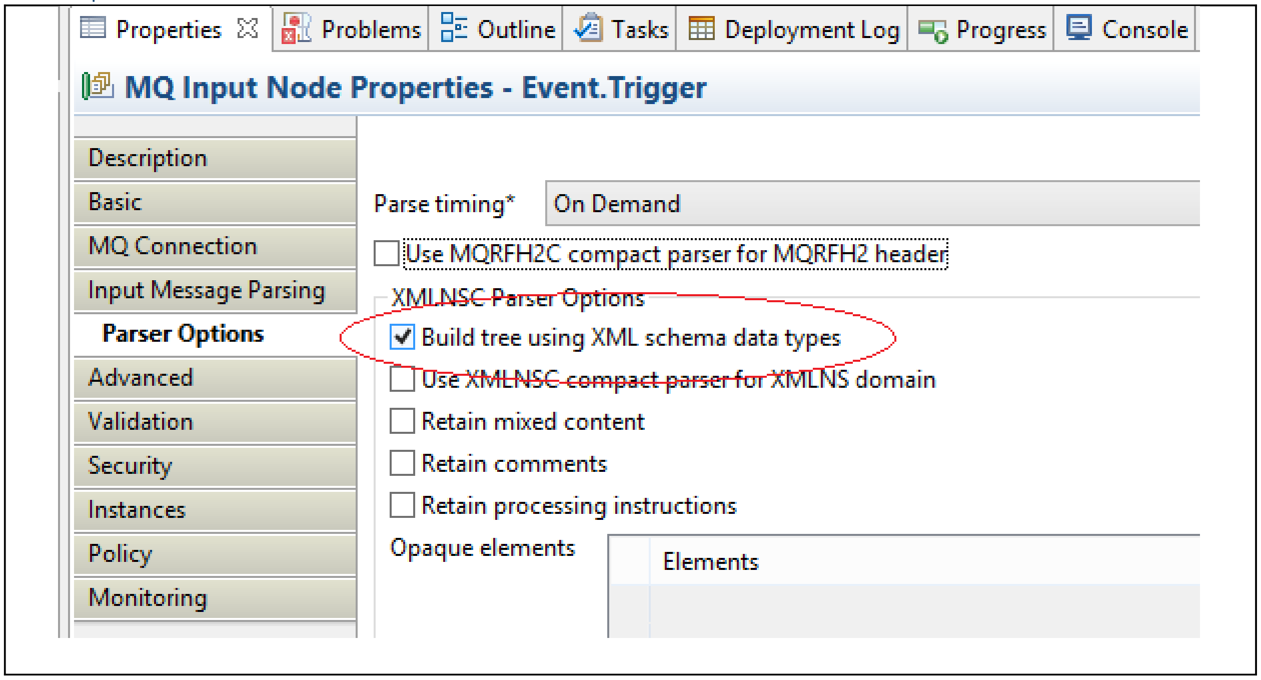
NA

### Rule: MQInputNode 'Build tree using XML schema data types' should be set Sonar Rule: R70

### Rational:

Some customers have a default standard of XMLNSC with schema checking/conversion.

Example:


Properties | Problems | Outline | Tasks | Deployment Log | Progress | Console

MQ Input Node Properties - Event.Trigger

Description
Basic
MQ Connection
Input Message Parsing
**Parser Options**
Advanced
Validation
Security
Instances
Policy
Monitoring

Parse timing* On Demand

☐ Use MQRFH2C compact parser for MQRFH2 header

XMLNSC Parser Options

☑ Build tree using XML schema data types

☐ Use XMLNSC compact parser for XMLNS domain

☐ Retain mixed content

☐ Retain comments

☐ Retain processing instructions

Opaque elements | Elements

Preferred:

NA

References:

NA

## Installation guide

The MB-Precise plugin runs on SonarQube (Sonar). There are a number of prerequsites to installing the plugin.

### 1. Java

Download and install a Java runtime and configure the appropriate JAVA_HOME environment variable so that java can run.

At the command prompt, type in

```
java –version
```

the command prompt output should be like the following:

```
java version "1.8.0_11"

Java(TM) SE Runtime Environment (build 1.8.0_11-b12)

Java HotSpot(TM) 64-Bit Server VM (build 25.11-b03, mixed mode)
```

### 2. SonarQube

Download and install SonarQube

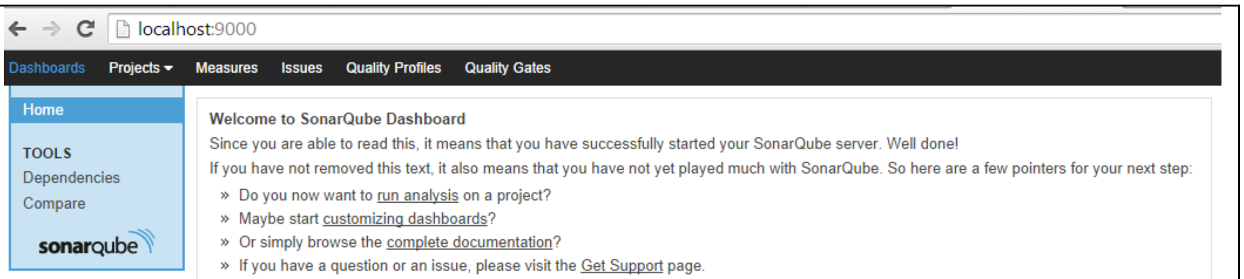
http://www.sonarqube.org/downloads/

Currently the MB-Precise plugin works on Sonar version 4.3.1+.

Start the server. Opening a browser, navigate to

http:\\localhost:9000

A page like the following should be displayed in Sonar is functioning correctly:



Welcome to SonarQube Dashboard

Since you are able to read this, it means that you have successfully started your SonarQube server. Well done!

If you have not removed this text, it also means that you have not yet played much with SonarQube. So here are a few pointers for your next step:

» Do you now want to run analysis on a project?
» Maybe start customizing dashboards?
» Or simply browse the complete documentation?
» If you have a question or an issue, please visit the Get Support page.

## 3. Sonar runner

Download and install sonar runner.

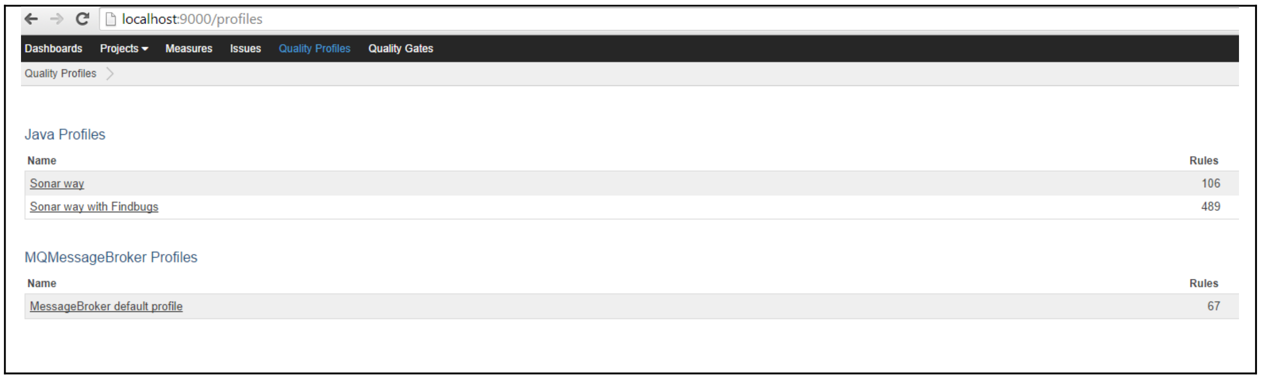
SonarRunner launches Sonar analysis on the client side.

http://www.sonarqube.org/downloads/

## 4. Install plugin

Copy the Mb_precise-x.jar into the 'extensions\plugins' folder on the Sonarqube server and restart the server.

Navigate to "profiles". The MB-Precise default profile should appear:



Java Profiles

| Name | Rules |
|---|---|
| Sonar way | 106 |
| Sonar way with Findbugs | 489 |

MQMessageBroker Profiles

| Name | Rules |
|---|---|
| MessageBroker default profile | 67 |

## 5. Configure sonar.properties

There are a number of additional properties that have been added that are used by the plugin:

This is threshold for how long the MQGet and other nodes with timeouts should wait. This check tries to prevent long processes that can block the Execution Group.

```
sonar.mb.flow.timeout.seconds=15
```

This property tells the plugin where to generate diagrams and documentation to. It is an absolute path. The following would send all diagrams to the "C:\test\demos\generated" directory.

```
sonar.mb.flow.diagram.output=C:\\test\\demos\\generated\\
```

This optional property tells the plugin what the common code heading block for ESQL should contain. This could be the company name and some copyright details. Is similar to what the maven plugin does:

http://mojo.codehaus.org/license-maven-plugin/check-file-header-mojo.html

```
sonar.mb.header.company=Richards Test Company
```

This is threshold for when a particular ESQL file is flagged as being complex. Its a numerical whole value and can be tuned as required.

```
sonar.mb.esql.complexity=16
```

This is threshold for when a particular ESQL function is flagged as being too long. Its a numerical whole value and can be tuned as required.

```
sonar.mb.esql.functionsize=32
```

This is threshold for when a particular line of ESQL is too long. Usually it has to able to be read without excessive scrolling.
Its a numerical whole value and can be tuned as required.

```
sonar.mb.esql.maxlinesize=99
sonar.mb.jdbc.*
```

This allows the plugin to connect to an active SQL/Relational datasource and validate that the tables and fields referenced in the code exist in the database. It also checks that queries are accessing tables against valid indexes.

```
sonar.mb.jdbc.driver=org.postgresql.Driver
sonar.mb.jdbc.url=http://localhost:9000/DemoDB
sonar.mb.jdbc.user=sa
sonar.mb.jdbc.password=password123
```

There are additional resources available:

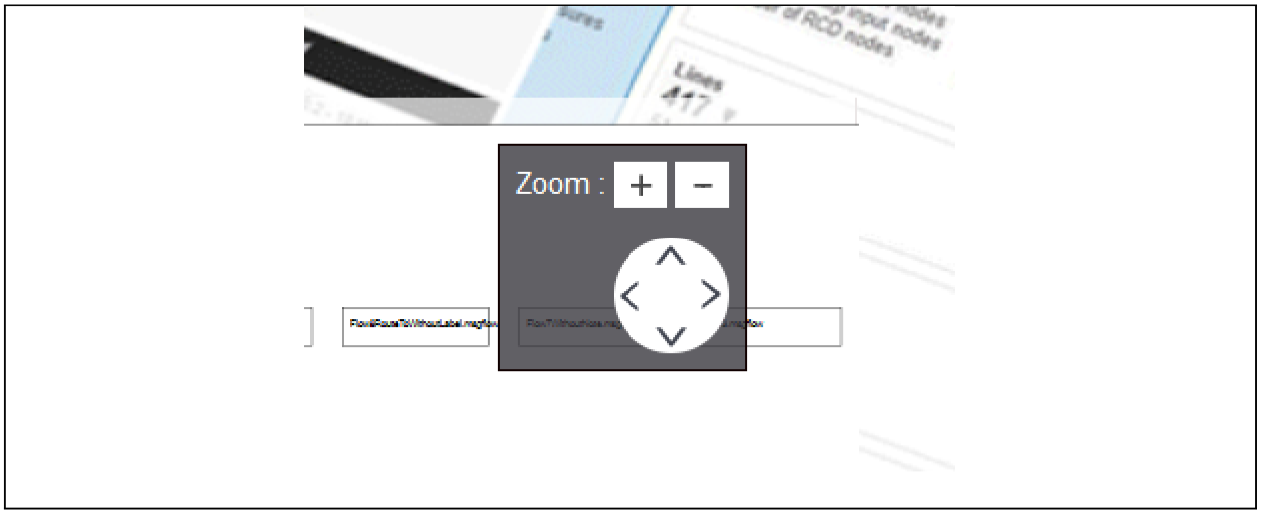
http://docs.codehaus.org/display/SONAR/Installing
http://docs.codehaus.org/display/SONAR/Analyzing+with+SonarQube+Runner
http://docs.codehaus.org/display/SONAR/Requirements#

## Document Generation

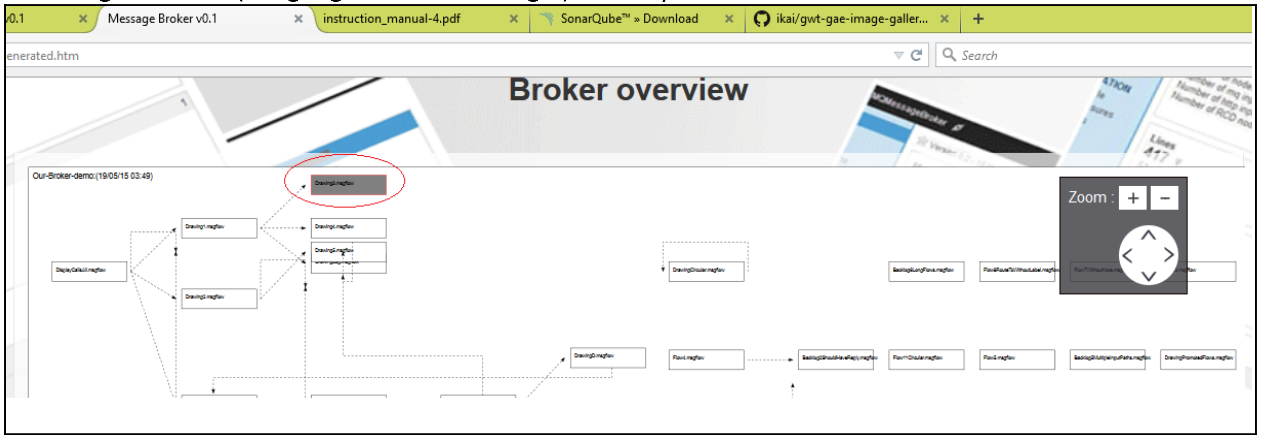
The plugin generates an overall diagram of the system from a flow perspective. It also loks to document each flows input/outputs and dependencies.
The document and diagram generation is controlled by the path set in the sonar.properties file

```
sonar.mb.flow.diagram.output=C:\\test\\demos5\\generated\\
```

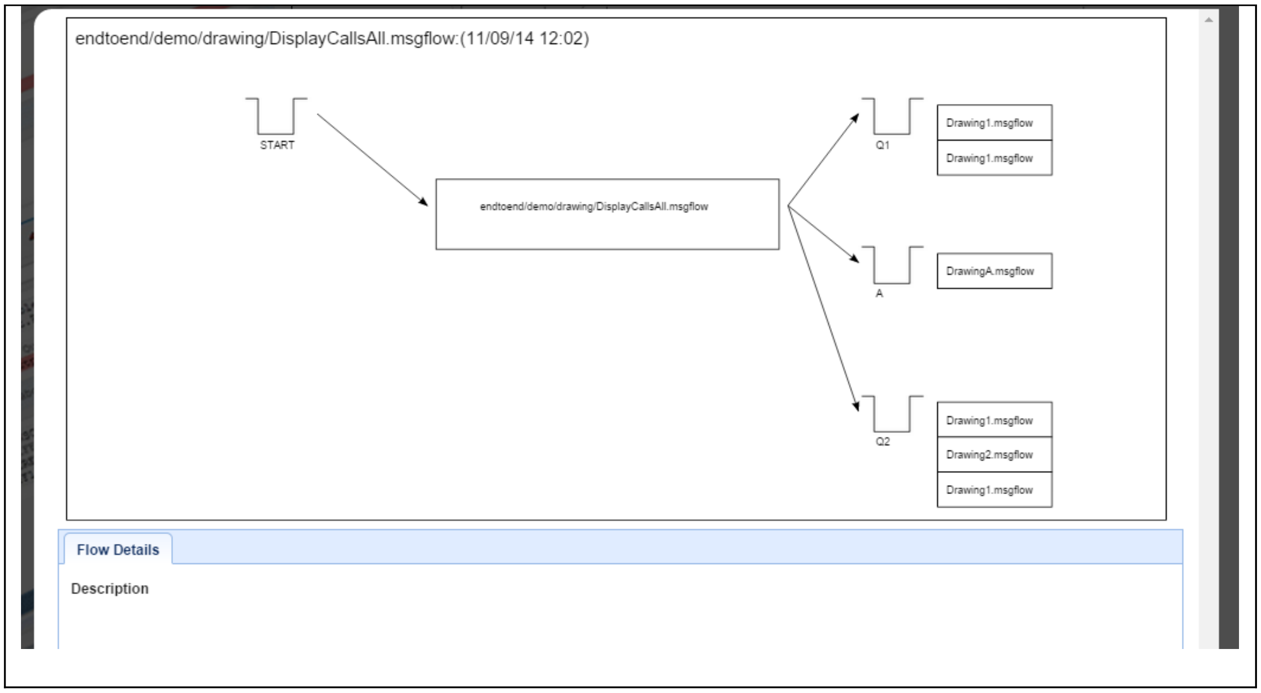
This is the directory in which the diagram will be generated into. This could be a local directory, an NFS folder, webDav or some other form of sharing/publication.
The diagram can be navigated using the arrows that provide panning and zoom functionality.



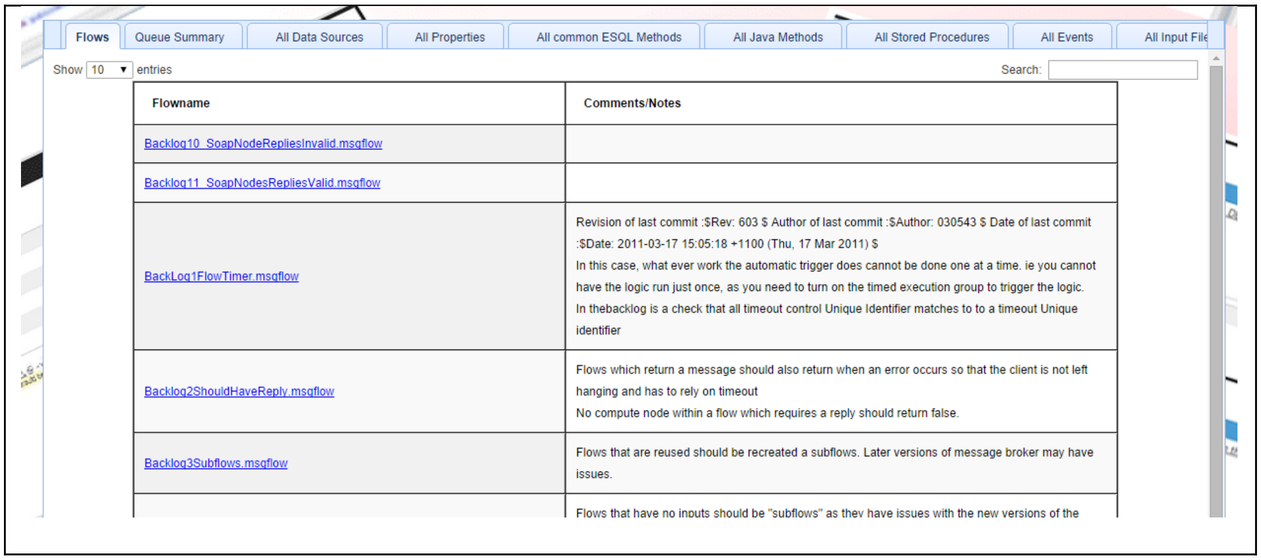
Clicking on a flow (a highlighted red rectangle) allows you to view the "flow" level.



Should open:



Along the bottom of the main diagram are tabs.
The tabs are a collection of information from the the project.



| Flowname | Comments/Notes |
|---|---|
| Backlog10_SoapNodeRepliesInvalid.msgflow | |
| Backlog11_SoapNodesRepliesValid.msgflow | |
| BackLog1FlowTimer.msgflow | Revision of last commit :$Rev: 603 $ Author of last commit :$Author: 030543 $ Date of last commit :$Date: 2011-03-17 15:05:18 +1100 (Thu, 17 Mar 2011) $<br>In this case, what ever work the automatic trigger does cannot be done one at a time. ie you cannot have the logic run just once, as you need to turn on the timed execution group to trigger the logic.<br>In thebacklog is a check that all timeout control Unique Identifier matches to to a timeout Unique identifier |
| Backlog2ShouldHaveReply.msgflow | Flows which return a message should also return when an error occurs so that the client is not left hanging and has to rely on timeout<br>No compute node within a flow which requires a reply should return false. |
| Backlog3Subflows.msgflow | Flows that are reused should be recreated a subflows. Later versions of message broker may have issues. |
| | Flows that have no inputs should be "subflows" as they have issues with the new versions of the |

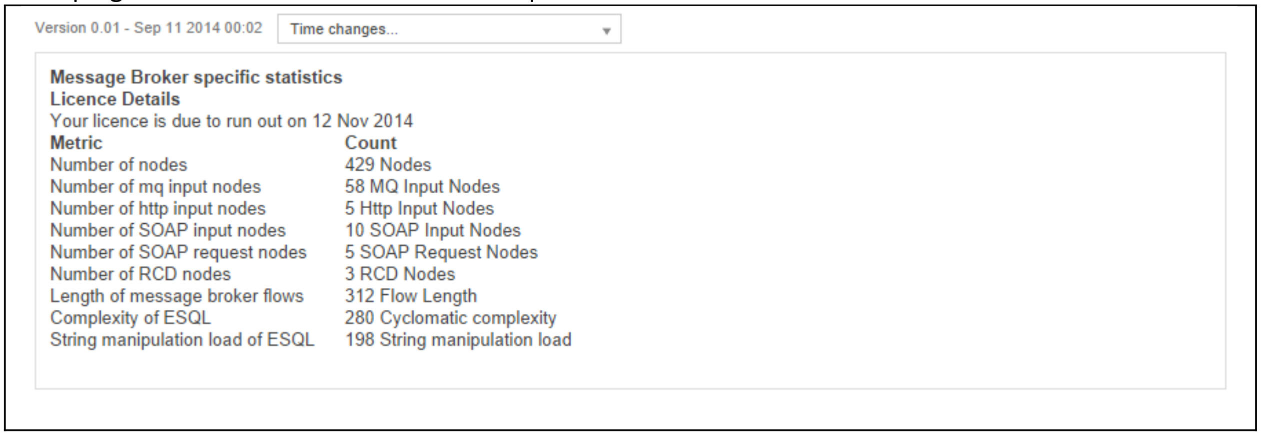
The tabs are:

| Tab | Description |
|---|---|
| **Flows** | a list of all flows and their notes/comments. |
| **Queue Summary** | a list of all queues and the flow they are used in. |
| **All Data Sources** | a list of all data sources used and in which flows. |

| | |
|---|---|
| **All Properties** | a list of all UDP's the flows they are used in. |
| **All common ESQL methods** | A list of all ESQL procedures/functions not associated with a Filter/Compute node. i.e. all "re-usable" procedures/functions. |
| **All java methods** | All java methods and the ESQL module they belong to. |
| **All stored procedures** | All stored procedures and the ESQL they belong to. |
| **All events** | All monitoring events created. |
| **All input files** | All file names used from flows |
| **All output files** | All file names used from flows |

## Metrics

The plugin creates additional metrics on top of the standard Sonar metrics.



Version 0.01 - Sep 11 2014 00:02 Time changes...

**Message Broker specific statistics**
**Licence Details**
Your licence is due to run out on 12 Nov 2014

| Metric | Count |
|---|---|
| Number of nodes | 429 Nodes |
| Number of mq input nodes | 58 MQ Input Nodes |
| Number of http input nodes | 5 Http Input Nodes |
| Number of SOAP input nodes | 10 SOAP Input Nodes |
| Number of SOAP request nodes | 5 SOAP Request Nodes |
| Number of RCD nodes | 3 RCD Nodes |
| Length of message broker flows | 312 Flow Length |
| Complexity of ESQL | 280 Cyclomatic complexity |
| String manipulation load of ESQL | 198 String manipulation load |

These can be selected and sorted by file.

| Metric | Description |
|---|---|
| **Number of nodes** | all nodes, which tells you which flows are the most complicated from the point of view of pure size. |
| **Number of http input nodes** | |
| **Number of SOAP input nodes** | |
| **Number of SOAP request nodes** | |
| **Number of RCD nodes** | which is useful for looking at performance |
| **Length of message broker flows** | which is useful for looking at performance |
| **Complexity of ESQL** | |
| **String manipulation load of ESQL** | which measures how many string manipulation functions a peice of ESQL calls. Which is useful for looking at performance. |