REFERENCES


[20]. Raincode SPRL, “Automatic migration of your Progress 4GL application to Java”, in *EU Gateway Program*, Belgium.


APPENDIX A: 4GL PROGRAM CODE & OUTPUT

- Sample Program 1

```c
/*-----------------------------------------------
File      : test_2b.p
Description: Write a call to an internal procedure to calculate the number of orders the customer placed during this year, and their total value. Display these values as part of (a) above
Author(s) : ISubasinghe
Created   : Wed Mar 17 08:40:44 IST 2010
Notes     :
-------------------------------------------------------------------------*/

/* ***************************  Definitions  ************************** */
DEFINE VARIABLE oCount AS INTEGER LABEL "No of Orders".
DEFINE VARIABLE oTotal AS INTEGER LABEL "Total".

/* ***************************  Main Block  *************************** */
FOR EACH Customer BREAK BY Customer.CustNum:
    RUN NoOfCustOrders(INPUT customer.CustNum, OUTPUT oCount, OUTPUT oTotal).
    DISPLAY Customer.CustNum
        Customer.Name
        Customer.CreditLimit
        oCount
        oTotal
    WITH SIZE 100 BY 100 .
END.

PROCEDURE NoOfCustOrders:
    DEFINE INPUT  PARAMETER ipCustNum LIKE customer.CustNum NO-UNDO.
    DEFINE OUTPUT PARAMETER oCount AS INTEGER.
    DEFINE OUTPUT PARAMETER oTotal AS INTEGER.
    FOR EACH ORDER
        WHERE ORDER.CustNum = ipCustNum
            AND YEAR(Order.OrderDate) = 1997:
            FOR EACH ORDERLINE OF ORDER:
                oCount = oCount + 1.
                oTotal = oTotal + (OrderLine.Qty * OrderLine.Price).
                /* ACCUMULATE OrderLine.Qty * OrderLine.Price (TOTAL).*/
                DISPLAY (ACCUM TOTAL OrderLine.Qty * OrderLine.Price) LABEL "Total".*/
            END.
    END.
END.
```
Sample Program 2

```plaintext
/*-----------------------------------------------*/
| File      : test_1b.p                           |
| Description: Modify the above code to delete all records where the credit limit is less than 100 and there are no orders placed. Both tasks should be performed within the same loop. |
| Author(s) : ISubasinghe                        |
| Created   : Tue Mar 16 18:23:23 IST 2010        |
| Notes     :                                   |
-- ------------------------------------------------

/** Definitions ***********************************/
DEFINE VARIABLE cNum LIKE Customer.CustNum NO-UNDO.
DEFINE VARIABLE cState LIKE Customer.State NO-UNDO.

DEFINE FRAME frmHead
```
HEADER
"Customers in " cState
WITH NO-LABEL.

.MAIN Block

FOR EACH Customer BREAK BY Customer.State:
  IF FIRST-OF(Customer.State) THEN
    DISPLAY Customer.State WITH FRAME frmHead NO-LABEL.
    DISPLAY Customer.CustNum
    Customer.Name
    Customer.CreditLimit.
  FIND FIRST Order OF CUSTOMER NO-LOCK NO-ERROR.
  IF AVAILABLE(Order) AND Customer.CreditLimit < 20000 THEN
    DO:
      ASSIGN cNum = Customer.CustNum.
      DELETE Customer.
      MESSAGE "CUSTOMER " cNum " DELETED".
    END.
  END.
END.

Sample Program 3
Sample Program 5

For each Customer:
- Display Customer.CustNum
- Display Customer.Name
- Display Customer.CreditLimit.

END.

---

```plaintext
/* File        : test_2a.p
   Description : Write a procedure which goes through the customer table and displays customer code,
                 name and credit limit.
   Author(s)   : ISubasinghe
   Created     : Wed Mar 17 08:18:32 IST 2010
   Notes       :
   *******************************************************/

/*------------------------------------------------------------------------
** Main Block ***********************************************************/

FOR EACH Customer:
- DISPLAY Customer.CustNum
  Customer.Name
  Customer.CreditLimit.
END.

---

```
OPEN QUERY q1 FOR EACH Customer.

GET FIRST q1 NO-LOCK.

cnt = NUM-RESULTS ("q1").

DO WHILE NOT QUERY-OFF-END ("q1") WITH FRAME DEFAULT-FRAME:

    DISPLAY Customer.CustNum
    Customer.Name
    cnt LABEL "No Of Results".
    GET NEXT q1 NO-LOCK.
    cnt = NUM-RESULTS ("q1").
END.

CLOSE QUERY q1.
Sample Program 6

```/*-----------------------------------------------*/
File    : test_3b.p
Description : b. Define and open a query that will preselect all customers, and all the orders for each
customer, if available.
        c. Display the customer code and name, the number of orders available per customer, and
the value of these orders.
Author(s) : ISubasinghe
Created    : Wed Mar 17 11:45:08 IST 2010
Notes      :
------------------------------------------------------------------------*/

/* ***************************  Definitions  ************************** */
DEFINE QUERY q1 FOR Customer, Order SCROLLING.
DEFINE VARIABLE cNum   LIKE Customer.CustNum.
DEFINE VARIABLE oCount AS   INT.

/* ***************************  Main Block  *************************** */
OPEN QUERY q1
    PRESELECT EACH Customer, EACH Order OF Customer.

DISPLAY NUM-RESULTS ("q1") LABEL "No Of Results" WITH FRAME frmHdr.
GET FIRST q1 NO-LOCK.
DO WHILE NOT QUERY-OFF-END ("q1") WITH FRAME DEFAULT-FRAME:
    ASSIGN cNum = Customer.CustNum.
    MESSAGE cNum VIEW-AS ALERT-BOX.
    DO WHILE Customer.CustNum = cNum WITH FRAME DEFAULT-FRAME:
        oCount = oCount + 1.
        GET NEXT q1.
    END.
    GET PREV q1.
    DISPLAY Customer.CustNum
    Customer.Name
    oCount LABEL "No Of Orders".
    oCount = 0.
    GET NEXT q1 NO-LOCK.
END.

CLOSE QUERY q1.
*/```
--- Sample Program 7 ---

```/* File : test_4b
   Description : Write a procedure which displays the code and name of all customers who have invalid orders, along with the order code and error status id
   Author(s) : ISubasinghe
   Created : Wed Mar 17 14:42:48 IST 2010
   Notes : */

/* Definitions */
DEFINE VARIABLE oState AS CHARACTER.
DEFINE VARIABLE oShipCount AS INT.
DEFINE VARIABLE oOrdCount AS INT.
DEFINE VARIABLE oBOCount AS INT.
DEFINE VARIABLE oPSCount AS INT.
DEFINE VARIABLE oINVCount AS INT.

/* Main Block */
FOR EACH Customer, EACH Order OF Customer:
   CASE Order.OrderStatus:
      WHEN "Ordered"  THEN oOrdCount  = oOrdCount  + 1.
      WHEN "Back Ordered" THEN oBOCount = oBOCount + 1.
      WHEN "Partially Shipped" THEN oPSCount = oPSCount + 1.
      OTHERWISE DO:
         oINVCount = oINVCount + 1.
      END.
   DISPLAY Customer.CustNum SKIP
      Customer.Name    SKIP
      Order.Ordernum   SKIP
      Order.OrderStatus.
   END CASE.
END.

IF oINVCount = 0 THEN
   MESSAGE "No Invalid Orders!" VIEW-AS ALERT-BOX.
*/```
**Sample Program 8**

```plaintext
/*-----------------------------------------------*/
File : test_4c.p
Description : Write a trigger to execute when an order is created, which sets the orderDate to the current date and the deliveryDate to two weeks from the current date
Author(s) : ISubasinghe
Created : Wed Mar 17 15:16:35 IST 2010
Notes : --------------------------------------------------*/

/* ***************************  Main Block  *************************** */

CREATE Order.
UPDATE Order.CustNum.
ASSIGN Order.CustNum.
DISPLAY Order.CustNum
  Order.OrderNum
  Order.OrderDate
  Order.PromiseDate.
```

![Program Workflow](image_url)
• Sample Program 9

```/*----------------------------------*/
File        : test_6.p
Description : a. Create temp-tables for the customer, order and orderline tables.
  b. Write code to accept user input for the customer code, and populate the temp-tables
  with related records
  c. Write the save procedure for the customer temp-table, where the new values are written
  back to the database only when the record in the database remains unchanged.
Author(s)   : ISubasinghe
Created     : Wed Mar 17 16:55:07 IST 2010
Notes       :
----------------------------------*/

/*****************************************************************************
Definitions
**************************************************************************/
DEFINE TEMP-TABLE ttCustomer LIKE Customer.
DEFINE TEMP-TABLE ttOrder   LIKE Order.
DEFINE TEMP-TABLE ttOrderLine LIKE OrderLine.

DEFINE VARIABLE cCustNum LIKE Customer.CustNum VIEW-AS FILL-IN.

/*****************************************************************************
Main Block
**************************************************************************/
CURRENT-WINDOW:WIDTH-CHARS = 110.
UPDATE cCustNum LABEL "Customer Number".

FIND FIRST Customer WHERE Customer.CustNum = cCustNum NO-ERROR.

IF AVAILABLE(Customer) THEN
  CREATE ttCustomer.
  BUFFER-COPY Customer TO ttCustomer.
  FOR EACH Order OF Customer WHERE Order.CustNum = cCustNum NO-LOCK:
    CREATE ttOrder.
    BUFFER-COPY Order TO ttOrder.

  FOR EACH OrderLine OF Order NO-LOCK:
    CREATE ttOrderLine.
    BUFFER-COPY OrderLine TO ttOrderLine.

  END.
END.
ELSE
  CREATE ttCustomer.
  UPDATE ttCustomer.Name
  ttCustomer.CreditLimit
  ASSIGN ttCustomer.CustNum = NEXT-VALUE(NextCustNum)
  ttCustomer.Name
  ttCustomer.CreditLimit
END.
```
FOR EACH ttCustomer NO-LOCK:
   DISPLAY TTcustomer WITH FRAME f1 WIDTH 100.
END.
RUN saveTtCustomer.

PROCEDURE saveTtCustomer:

   FOR EACH ttCustomer:
      FIND Customer WHERE Customer.CustNum = ttCustomer.CustNum EXCLUSIVE-LOCK NO-ERROR.
      IF CAN-FIND (Customer) THEN
         IF CURRENT-CHANGED (Customer) THEN
            MESSAGE "Customer record has been changed! Cannot Continue to copy."
            VIEW-AS ALERT-BOX ERROR.
         ELSE
            CREATE Customer.
            BUFFER-COPY ttCustomer TO Customer.
            MESSAGE "Customer " CUSTNUM " saved!" VIEW-AS ALERT-BOX BUTTON OK.
      END.
   END.
END.
Sample Program 10

```c
/*----------------------------------------------------------
  File   : test_7a.p
  Description : Write the code for a procedure which calls a persistent procedure, which in turn calls
                an internal procedure in the parent to display an error message which is sent in by the persistent
                procedure.
  Author(s) : ISubasinghe
  Created  : Wed Mar 17 18:11:29 IST 2010
  Notes    :
  -----------------------------------------------------------*/

DEFINE VARIABLE hParent AS HANDLE.

RUN test_7persistent.p PERSISTENT (INPUT THIS-PROCEDURE).

PROCEDURE displayError:
  DEFINE INPUT PARAMETER msg AS CHARACTER.
  MESSAGE msg VIEW-AS ALERT-BOX ERROR.
END.
```
Sample Program 11

```c
/*------------------------------------------------------------------------
File        : test_7persistent.p
Author(s)   : ISubasinghe
Created     : Wed Mar 17 18:22:17 IST 2010
Notes       :
------------------------------------------------------------------------*/

/* ***************************  Definitions  ************************** */
DEFINE VARIABLE errMsg AS CHARACTER INITIAL "My Message from test_7persistent.p!".
DEFINE INPUT PARAMETER hParent AS HANDLE.

RUN displayError IN hParent (INPUT errMsg).
```
Sample Program 12

```
/* Program name: ReverseHash.p */
/* Description: Decrypt hash to return word generated through hash() */
/* where base value is 7 and multiplier wise */
/* Syntax: RUN ReverseHash.p(INPUT int64HashNum). */
/* Author: Ilakshini Subasinghe */
/* Date created: 06-MAR-2015 */

/* ************** I/O Param ************** */
DEFINE INPUT PARAMETER ipi64HashValue AS INT64 NO-UNDO.

/* ************** Forward Declarations ************** */
FUNCTION fnGetChar RETURNS CHAR (INPUT-OUTPUT iReverseHash AS INT64) FORWARD.

/* ************** Internal Variables ************** */
DEFINE VARIABLE i AS INTEGER NO-UNDO.
DEFINE VARIABLE iReverseHash AS INT64 INITIAL 371580748701652777 NO-UNDO.
DEFINE VARIABLE word AS CHARACTER NO-UNDO.
DEFINE VARIABLE iBase AS INTEGER INITIAL "7" NO-UNDO.

/* ************** MAIN ************** */
ASSIGN iReverseHash = ipi64HashValue. /* Backup Value */

/* Get each letter from hash (Returns last letter first) */
DO WHILE (iReverseHash > iBase):
  ASSIGN word = fnGetChar(INPUT-OUTPUT iReverseHash) + word.
END.

/* Display Result */
MESSAGE "Your Word Embedded in" ipi64HashValue "is:" SKIP word
VIEW-AS ALERT-BOX.

/* ************** END MAIN ************** */

/* ************** Function Declarations ************** */
FUNCTION fnGetChar RETURNS CHARACTER (INPUT-OUTPUT iReverseHash AS INT64):
/* ------- */
/* Function: fnGetChar */
/* Purpose: Returns Character Hidden in Hash Number. */
/* Parameters: i/p: Hash Number */
/* ------- */
DEFINE VARIABLE i AS INTEGER NO-UNDO.
DEFINE VARIABLE i64Remainder AS INT64 NO-UNDO.
DEFINE VARIABLE cLetters AS CHARACTER NO-UNDO.
DEFINE VARIABLE iBase AS INTEGER INITIAL "7" NO-UNDO.
DEFINE VARIABLE iMultiplier AS INTEGER INITIAL "47" NO-UNDO.

ASSIGN
cLetters = "abcdeghilmnopqrstuvwxyz".
```
IF iReverseHash = iBase THEN
    RETURN "".

DO  i = 1 TO LENGTH(cLetters):
    i64Remainder = iReverseHash - i.
    IF i64Remainder MODULO iMultiplier = 0 THEN
        DO:
            ASSIGN
                iReverseHash = i64Remainder / iMultiplier.
            RETURN SUBSTRING(cLetters,i,1).
        END.
    END.
END.
END.
APPENDIX B: CLASSIFICATION OUTPUT

Rules.NNg (WEKA)

=== Run information ===

Scheme: weka.classifiers.rules.NNg -G 5 -I 5
Relation: 4GLkeywords
Instances: 34
Attributes: 4
  - token_type_parent
  - token_type_child1
  - token_type_child2
  - mxgraph_vertex_shape
Test mode: evaluate on training data

=== Classifier model (full training set) ===

NNGE classifier

Rules generated:

- class loop IF : token_type_parent in {DO,FOR,PRESELECT,PROMPT-FOR,UPDATE} ^
  token_type_child1 in {PRESELECT,TO,EACH,EDITING} ^ token_type_child2 in {FIRST,?}  (6)
- class loop IF : token_type_parent in {DO,FOR,PRESELECT} ^ token_type_child1 in
  {FOR,FIRST,LAST,PRESELECT} ^ token_type_child2 in {EACH,LAST}  (8)
- class rhombus IF : token_type_parent in {DISPLAY,DO,PROMPT-FOR,UPDATE,IF} ^
  token_type_child1 in {WHEN,QUERY-TUNING,WHILE,CAN-DO} ^ token_type_child2 in {?}  (6)
- class rhombus IF : token_type_parent in {ASSIGN,CASE} ^ token_type_child1 in {WHEN,?}^ token_type_child2 in {?}  (2)
- class default IF : token_type_parent in
  {DISPLAY,DEFINE,DO,FOR,PRESELECT,PROMPT-FOR,UPDATE} ^ token_type_child1 in
  {VARIABLE,TEMP-TABLE,BUFFER,FOR,FIRST,LAST,?} ^ token_type_child2 in {FIRST,?}  (12)

Stat:
- class default : 1 exemplar(s) including 1 Hyperrectangle(s) and 0 Single(s).
- class rhombus : 2 exemplar(s) including 2 Hyperrectangle(s) and 0 Single(s).
- class loop : 2 exemplar(s) including 2 Hyperrectangle(s) and 0 Single(s).

Total : 5 exemplars(s) including 5 Hyperrectangle(s) and 0 Single(s).

Feature weights : [0.5212479644597324 1.1260791090720865 0.41986782197619277]

Time taken to build model: 0 seconds

=== Predictions on training set ===

inst#, actual, predicted, error, probability distribution
1 1:default 2:rhombus  + 0 *1 0
2 1:default 1:default *1 0 0
3 1:default 1:default *1 0 0
4 1:default 1:default *1 0 0
5 1:default 3:loop  + 0 0 *1
=== Evaluation on training set ===

Correctly Classified Instances          26               76.4706 %
Incorrectly Classified Instances         8               23.5294 %
Kappa statistic                          0.6334
Mean absolute error                      0.1569
Root mean squared error                  0.3961
Relative absolute error                 36.0976 %
Root relative squared error             85.0462 %
Total Number of Instances               34

=== Detailed Accuracy By Class ====

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>ROC Area</th>
<th>Class</th>
</tr>
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<tbody>
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<td>0.333</td>
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<td>0.667</td>
<td>1</td>
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<td>0.825</td>
<td>loop</td>
</tr>
</tbody>
</table>

Weighted Avg. 0.765 0.153 0.837 0.765 0.727 0.806

=== Confusion Matrix ====

a b c <-- classified as
4 1 7 | a = default
0 8 0 | b = rhombus
0 0 14 | c = loop
Bayes.NaiveBayes (WEKA)

=== Run information ===
Scheme:       weka.classifiers.bayes.NaiveBayes
Relation:     4GLkeywords
Instances:    34
Attributes:   4
token_type_parent
token_type_child1
token_type_child2
mxgraph_vertex_shape
Test mode:    evaluate on training data

=== Classifier model (full training set) ===

Naive Bayes Classifier

<table>
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<tr>
<th>Class</th>
<th>attribute</th>
<th>default</th>
<th>rhombus</th>
<th>loop</th>
</tr>
</thead>
<tbody>
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<td>(0.35)</td>
<td>(0.24)</td>
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</table>
Time taken to build model: 0 seconds

--- Predictions on training set ---

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<th>predicted</th>
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<td>1:default</td>
<td>0.823</td>
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</tr>
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<tr>
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<td>3:loop</td>
<td>0.412</td>
<td>+</td>
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<tr>
<td>18</td>
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<td>2:rhombus</td>
<td>0.659</td>
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<tr>
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<td>2:rhombus</td>
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<tr>
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<td>0.708</td>
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<tr>
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<td>3:loop</td>
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<tr>
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<td>3:loop</td>
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<tr>
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</tr>
<tr>
<td>27</td>
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<td>3:loop</td>
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</tr>
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<td>3:loop</td>
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<td>3:loop</td>
<td>0.569</td>
<td></td>
</tr>
<tr>
<td>31</td>
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<td>3:loop</td>
<td>0.569</td>
<td></td>
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<tr>
<td>32</td>
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<td>3:loop</td>
<td>0.569</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>3:loop</td>
<td>3:loop</td>
<td>0.569</td>
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</tr>
<tr>
<td>34</td>
<td>3:loop</td>
<td>3:loop</td>
<td>0.569</td>
<td></td>
</tr>
</tbody>
</table>

--- Evaluation on training set ---

Time taken to test model on training data: 0.08 seconds

--- Summary ---

Correctly Classified Instances 25 73.5294 %
Incorrectly Classified Instances 9 26.4706 %
Kappa statistic 0.5785
Mean absolute error 0.2605
Root mean squared error 0.314
Relative absolute error 67.4255 %
Root relative squared error 91.765 %
Coverage of cases (0.95 level) 100 %
Mean rel. region size (0.95 level) 91.1765 %
Total Number of Instances 34

--- Detailed Accuracy By Class ---

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>MCC</th>
<th>ROC Area</th>
<th>PRC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.417</td>
<td>0.000</td>
<td>1.000</td>
<td>0.417</td>
<td>0.588</td>
<td>0.562</td>
<td>0.977</td>
<td>0.972</td>
<td>default</td>
</tr>
<tr>
<td>0.750</td>
<td>0.000</td>
<td>1.000</td>
<td>0.750</td>
<td>0.857</td>
<td>0.835</td>
<td>1.000</td>
<td>1.000</td>
<td>rhombus</td>
</tr>
</tbody>
</table>
1.000 0.450 0.609 1.000 0.757 0.579 0.993 0.990  loop
Weighted Avg. 0.735 0.185 0.839 0.735 0.721 0.633 0.989 0.986

=== Confusion Matrix ===

a b c <-- classified as
5 0 7 | a = default
0 6 2 | b = rhombus
0 0 14 | c = loop

Trees.J48 (WEKA)

=== Run information ===

Scheme:       weka.classifiers.trees.J48 -C 0.25 -M 2
Relation:     4GLkeywords
Instances:    34
Attributes: 4
    token_type_parent
    token_type_child1
    token_type_child2
    mxgraph_vertex_shape
Test mode:    evaluate on training data

=== Classifier model (full training set) ===

J48 pruned tree

------------------
token_type_child1 = VARIABLE: default (1.17/0.03)
token_type_child1 = TEMP-TABLE: default (1.17/0.03)
token_type_child1 = BUFFER: default (1.17/0.03)
token_type_child1 = FOR: loop (3.52/1.52)
token_type_child1 = FIRST: default (4.69/2.14)
token_type_child1 = LAST: default (4.69/2.14)
token_type_child1 = WHEN: rhombus (4.69/0.55)
token_type_child1 = QUERY-TUNING: rhombus (1.17/0.14)
token_type_child1 = WHILE: rhombus (1.17/0.14)
token_type_child1 = CAN-DO: rhombus (1.17/0.14)
token_type_child1 = PRESELECT: loop (3.52/0.52)
token_type_child1 = TO: loop (1.17/0.17)
token_type_child1 = EACH: loop (2.34/0.34)
token_type_child1 = EDITING: loop (2.34/0.34)

Number of Leaves :  14
Size of the tree :   15

Time taken to build model: 0.01 seconds

=== Predictions on training set ===

inst# actual predicted error prediction
  1 1:default 3:loop + 0.412
  2 1:default 1:default 0.971
  3 1:default 1:default 0.971
  4 1:default 1:default 0.971
  5 1:default 3:loop + 0.412
  6 1:default 3:loop + 0.569
### Evaluation on training set ===

Time taken to test model on training data: 0.07 seconds

### Summary ===

Correctly Classified Instances          24               70.5882 %
Incorrectly Classified Instances        10               29.4118 %
Kappa statistic                          0.543
Mean absolute error                      0.2161
Root mean squared error                  0.3034
Relative absolute error                  49.7226 %
Root relative squared error              65.1435 %
Coverage of cases (0.95 level)           100     %
Mean rel. region size (0.95 level)       68.6275 %
Total Number of Instances               34

### Detailed Accuracy By Class ===

<table>
<thead>
<tr>
<th>TP Rate</th>
<th>FP Rate</th>
<th>Precision</th>
<th>Recall</th>
<th>F-Measure</th>
<th>MCC</th>
<th>ROC Area</th>
<th>PRC Area</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.583</td>
<td>0.182</td>
<td>0.636</td>
<td>0.609</td>
<td>0.609</td>
<td>0.410</td>
<td>0.852</td>
<td>0.720</td>
<td>default</td>
</tr>
<tr>
<td>0.875</td>
<td>0.000</td>
<td>1.000</td>
<td>0.875</td>
<td>0.933</td>
<td>0.918</td>
<td>0.990</td>
<td>0.958</td>
<td>rhombus</td>
</tr>
<tr>
<td>0.714</td>
<td>0.300</td>
<td>0.625</td>
<td>0.714</td>
<td>0.667</td>
<td>0.408</td>
<td>0.954</td>
<td>0.912</td>
<td>loop</td>
</tr>
</tbody>
</table>

Weighted Avg. 0.706 0.188 0.717 0.706 0.709 0.529 0.926 0.855

### Confusion Matrix ===

<table>
<thead>
<tr>
<th>a</th>
<th>b</th>
<th>c</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>0</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
<td>10</td>
</tr>
</tbody>
</table>

a = default
b = rhombus
c = loop
KNearestNeighbour (Java-ML)