**Description:**
- In the experiment you will be given the code differences between two releases (old and new) of a selected source or header file
    - o Each line begins with the symbol "+" means it has been added (new release)
    - o Each line begins with the symbol "-" means it has been removed (old release)
    - o Each line does not start with "+" or "-" means it remains the same in the both releases (common)
- The UML class diagram of the old release is also provided next to the code changes
- For each case you have to decide if the code changes cause a design change or not (i.e. change the given UML diagram). Design change means:
    - o Add or delete a class
    - o Add or delete method
    - o Add or delete inheritance relationship
    - o Add or delete association relationship
    - o Add or delete aggregation relationship
    - o Add or delete dependency relationship

Relationships
- Association from class A to class B, if A has a data member of type B.
- Aggregation between class A and class B, if A has a container *data member* that contains objects of B.
- Dependency from class A to class B, if A has a method contains a local variable of type B.
- **Key:**

    - o   Generalization

    - o   Dependency

    - o   Aggregation

    - o   Association
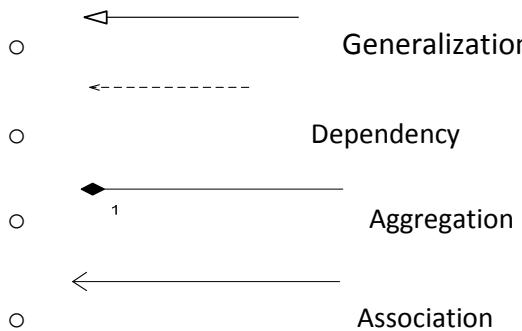
Important notes
- *Ignore multiplicity of relationships.* For example if there exist a dependency between two classes in the given UML diagram and the code change shows that the same dependency has been added, then it is not a design change.
- *Ignore method overloading.* Consider only unique method names.

               1

- **Case 1:**

--- ../HippoDraw-1.18.1/reps/AxisRepColor.cxx   2006-05-17 15:47:14.000000000 -0400

+++ ../HippoDraw-1.19.1/reps/AxisRepColor.cxx   2006-10-16 18:25:24.000000000 -0400

```
#include "graphics/DataView.h"
 #include "pattern/string_convert.h"
 #include "transforms/BinaryTransform.h"
+#include "plotters/PlotterBase.h"
+
 #include <algorithm>
 #include <functional>
@@ -100,7 +102,12 @@
  float x = mx + 0.5 * mw;
  float y = 30;
 + if (m_titleFont != 0) {
+   y = y + 1.2 * m_titleFont->pointSize() - 11.0; //experimental
+ }
+
  if ( m_zLabelFont != 0 ) {
+   y = y + 1.2 * m_zLabelFont->pointSize() - 8.0; // experimental
   view.drawText ( z_label, x, y, 0.0, 0.0, 'c', 'b',
                 false, m_zLabelFont );
  } else {
@@ -221,6 +228,7 @@
 drawColorScale ( const BinToColor & bin_to_color, ViewBase & base )
 {
  DataView & view = dynamic_cast < DataView & > ( base );
+ PlotterBase * plotter = view.getPlotter ();
  const Rect & margin = view.getMarginRect();
@@ -234,7 +242,10 @@
  }
  for ( float i = 0; i <= margin.getWidth() ; i++ ) {
-  Color color;
+   const Color & rep_color = plotter->repColor();
+
+       Color color = rep_color;
+
   bin_to_color.doubleToColor ( value, color );
   view.drawViewSquare ( margin.getX() + i,
```
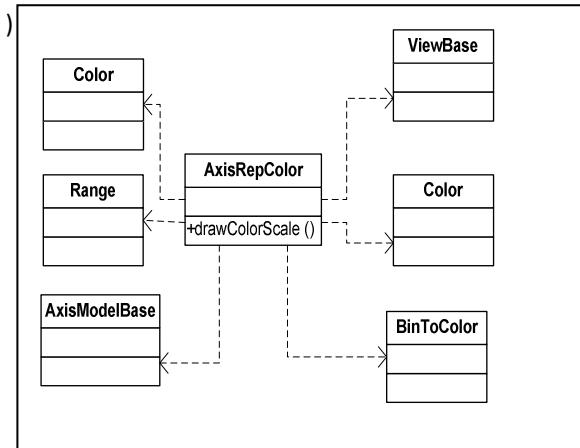

Does this change add/delete……..in this UML class diagram:

Classes: *YES NO*   **Relationships:** *YES NO*   **Methods:** *YES NO*

IF YES what are the changes?

Case 2:

--- ../HippoDraw-1.18.1/binners/Bins1DProfile.cxx   **2006-08-23 14:15:30.000000000 -0400**

+++ ../HippoDraw-1.19.1/binners/Bins1DProfile.cxx   **2006-12-08 14:17:42.000000000 -0500**

-$Id: Bins1DProfile.cxx,v 1.82 2006/08/23 18:14:11 pfkeb Exp $

+$Id: Bins1DProfile.cxx,v 1.84 2006/12/08 19:15:34 pfkeb Exp $

int Bins1DProfile::getNumberOfEntries (int i) const
 {
- return *(m_num.begin() + i + 1);
+//   return *(m_num.begin() + i + 1);
+ return static_cast < int > (m_num [i+1]);
 }

 int Bins1DProfile::getUnderflow () const
@@ -119,13 +120,13 @@
 }

-void Bins1DProfile::accumulate(double x, double y, double, double)
+void Bins1DProfile::accumulate(double x, double y, double wt, double)
 {
   int i = binNumber (x);

- m_sum[i] += y;
+ m_sum[i] += y * wt;
   m_sumsq[i] += y * y;
- m_num[i] ++;
+ m_num[i] += wt;

   m_empty = false;
 }
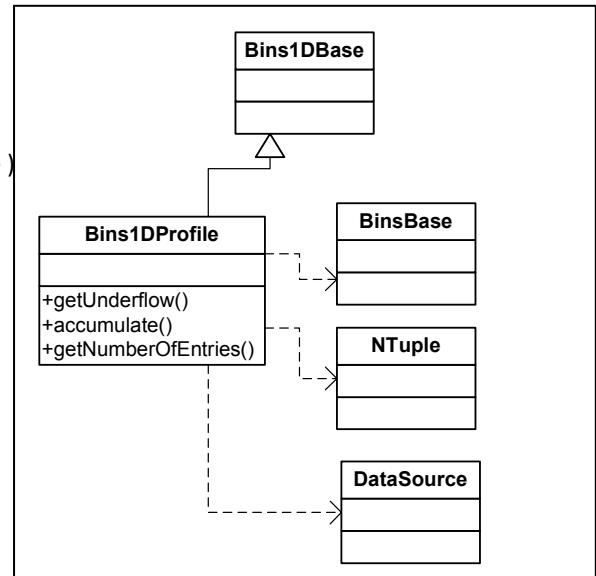
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 3:

--- ../HippoDraw-1.18.1/reps/BinToGreyScale.cxx   2006-08-14 19:32:02.000000000 -0400
+++ ../HippoDraw-1.19.1/reps/BinToGreyScale.cxx   2006-09-27 09:22:22.000000000 -0400

-BinToGreyScale class implementation
+hippodraw::BinToGreyScale class implementation

```
 #include "reps/BinToGreyScale.h"
 -namespace hippodraw {
+using namespace hippodraw;
 BinToGreyScale::
 BinToGreyScale ( const char * name )
@@ -33,10 +33,20 @@
 BinToGreyScale::
 doubleToColor ( double value, Color & color ) const
 {
-  double tmp = 255. -  ( ( value - m_vmin ) / m_dv ) * 255.;
-  int itmp = static_cast< int> ( tmp );
+  int red=color.getRed();
+  int green=color.getGreen();
+  int blue=color.getBlue();
+  double tmp = ( value - m_vmin ) / m_dv ;
+  double red_tmp   = 255. - tmp * ( 255. - static_cast < double > ( red) );
+  double green_tmp = 255. - tmp * ( 255. - static_cast < double > ( green ) );
+  double blue_tmp  = 255. - tmp * ( 255. - static_cast < double > ( blue ) );
+  int ired_tmp = static_cast< int> ( red_tmp );
+  int igreen_tmp = static_cast< int> ( green_tmp );
+  int iblue_tmp = static_cast< int> ( blue_tmp );
-  color.setColor ( itmp, itmp, itmp );
+  color.setColor ( ired_tmp, igreen_tmp, iblue_tmp );
 }
-} // namespace hippodraw
```
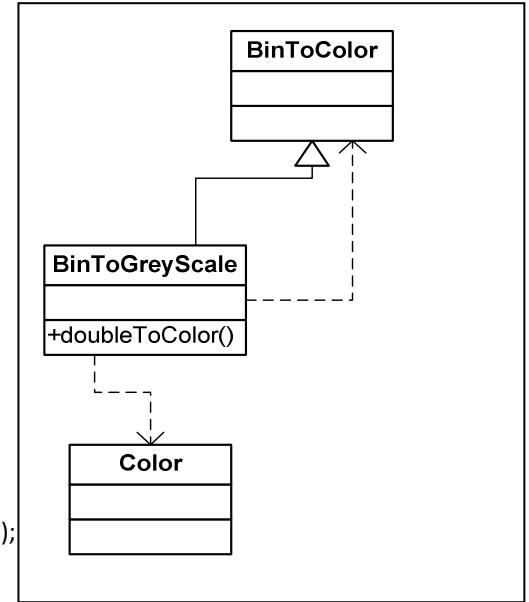

**Does this change add/delete……..in this UML class diagram:**

Classes: *YES NO*   **Relationships:** *YES NO*   **Methods** *YES NO*

IF YES what are the changes?

Case 4:

```
 #include "graphics/ViewBase.h"
 #include "transforms/PeriodicBinaryTransform.h"

+#include "plotters/PlotterBase.h"
 #include <cassert>
 #include <cmath>

@@ -36,6 +38,7 @@
 {
   BinToColorFactory * factory = BinToColorFactory::instance ();
   m_bin_to_color = factory -> create ( "Rainbow" );
+  m_box_edge = false;
 }

 ColorBoxPointRep::ColorBoxPointRep ( const ColorBoxPointRep & point_rep )
@@ -44,6 +47,7 @@
   BinToColor * btc = point_rep.m_bin_to_color;

   m_bin_to_color = btc -> clone ();
+  m_box_edge = point_rep.m_box_edge;
 }

 ColorBoxPointRep::~ColorBoxPointRep()
@@ -80,6 +84,7 @@
                   ViewBase * view )
 {
   const Range & range = view -> getRange ( Axes::Z );
+  PlotterBase * plotter = view -> getPlotter ();

   double high = range.high();
   double low = range.low();
@@ -102,7 +107,9 @@
   bool surpress_zero = low == 0.0;

   unsigned int size = ntuple -> rows ();
-  Color color;
+
+  const Color & rep_color = plotter->repColor();
+
   // Set rotation parameters.
@@ -164,7 +171,11 @@
     return;
    }

+
   bt -> transformZ ( value );
+
```
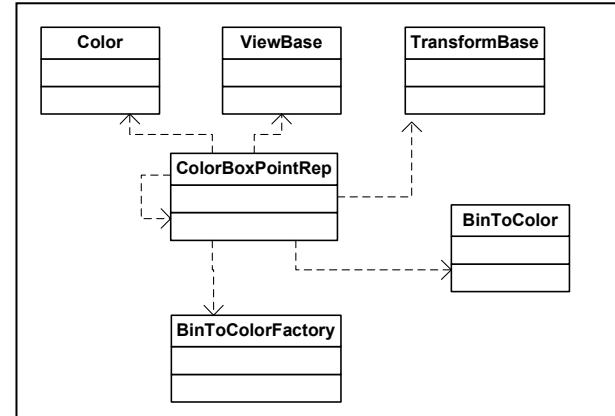
```
+        Color color = rep_color;
     if ( value > user_rect.getZ() ) {
       if ( !user_rect.isInDepth ( value ) ) {
         double x(0), y(0);
@@ -181,8 +192,27 @@
                  color.getRed (),
                  color.getGreen(),
                  color.getBlue() );
+      if (m_box_edge) {
+        std::vector<double> x;
+        x.push_back(x1);
+        x.push_back(x2);
+        x.push_back(x2);
+        x.push_back(x1);
+        x.push_back(x1);
+
+        std::vector<double> y;
+        y.push_back(y1);
+        y.push_back(y1);
+        y.push_back(y2);
+        y.push_back(y2);
+        y.push_back(y1);
+
+        Color color(Color::black);
+        view->drawPolyLine ( x, y, Line::Solid, color, 1.0 );
     }
   }
+
+ }
+
+void
+ColorBoxPointRep::setBoxEdge( bool show )
+{
+ m_box_edge = show;
+}
```
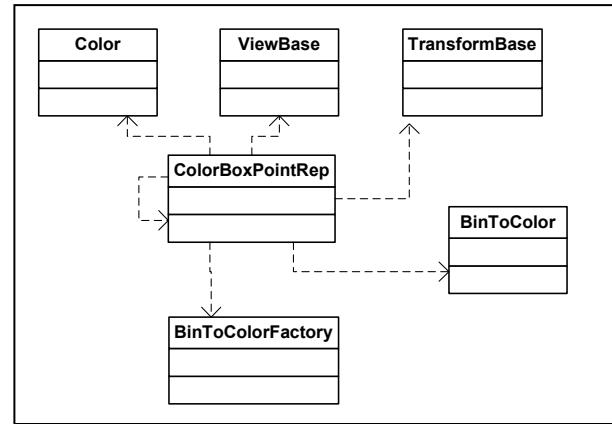

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 5:

```
--- ../HippoDraw-1.18.1/qt/CreateNTuple.cxx    2006-06-04 19:11:34.000000000 -0400
+++ ../HippoDraw-1.19.1/qt/CreateNTuple.cxx    2006-11-12 11:16:42.000000000 -0500

+#ifdef HAVE_CONFIG_H
+#include "config.h"
+#endif
+
 #include "CreateNTuple.h"
  #include "CanvasWindow.h"
 #include "WindowController.h"
 #include "Inspector.h"
 #include "QtFileDialog.h"
 #include "QtSortedCheckListItem.h"
 #include "qcombobox.h"
 #include "qlineedit.h"
 #include "qmessagebox.h"
#include "datasrcs/TupleCut.h"
 #include "controllers/CutController.h"
-#include "plotters/CutPlotter.h"
 #include "plotters/Cut2DPlotter.h"

 #include "fits/FitsController.h"
@@ -137,7 +140,7 @@
        const std::string & label = cp2-> getLabel(Axes::Y);
        double min = cutrange.low();
        double max = cutrange.high();
-       //const std::string & inversion = (cp2->getCutInversionY())?"Inverted":"";
+
        QtSortedCheckListItem * item
         = new QtSortedCheckListItem (m_CutListView,dummy);
        item->setText( 1, QString("%1").arg ( label.c_str() ) );

- if ( suffix == ".fits" )
+ if ( suffix == ".fits" || suffix == ".gz" )
   {
 #ifdef HAVE_CFITSIO
    FitsController * fc = FitsController::instance();
    // int retVal =
-   fc->createNTupleToFile ( m_column_list, m_cut_list, ds, filename, name);
+//    fc -> writeNTupleToFile ( m_column_list, m_cut_list, ds, filename, name);
+   fc -> writeNTupleToFile ( ds, filename, name, m_column_list, m_cut_list);
```
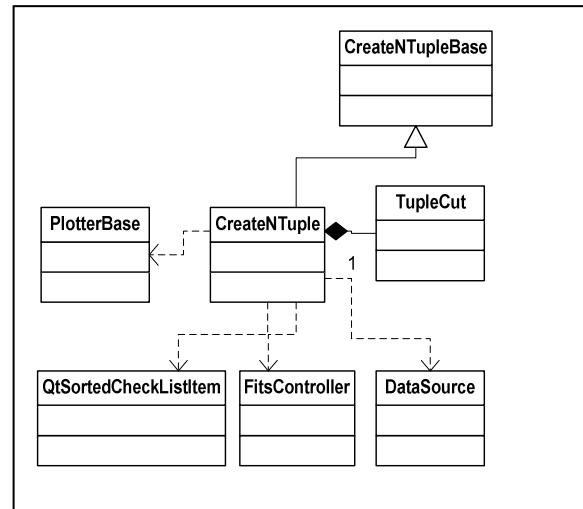

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 6:

--- ../HippoDraw-1.18.1/controllers/CutController.cxx   2006-02-22 15:37:26.000000000 -0500
+++ ../HippoDraw-1.19.1/controllers/CutController.cxx   2006-09-11 15:34:14.000000000 -0400
```
 void
 CutController::
-setZoomPan ( PlotterBase * cut_plotter,
-          Axes::Type axis,
-          bool yes )
+setZoomPan ( PlotterBase * cut_plotter, Axes::Type axis, bool yes )
 {
   if ( yes )
     m_zoom_pan.push_back ( make_pair( cut_plotter, axis ) );

   return found;
 }
+
+void
+CutController::
+fillAcceptedRows ( std::vector < bool > & acceptArray,
+                   const DataSource * source,
+                   const std::vector < const TupleCut * > & cut_list )
+{
+  acceptArray.clear ();
+
+  std::size_t size = source -> rows ();
+  acceptArray.reserve ( size );
+
+  std::size_t num_cuts = cut_list.size ();
+  for ( unsigned int i = 0; i < size; i++ )
+  {
+    // If cut is not selected, default is accept.
+    bool accept = true;
+
+    // Check all the cuts.
+    for ( unsigned int j = 0; j < num_cuts; j++ )
+      {
+        const TupleCut * tc = cut_list[j];
+        accept = tc -> acceptRow ( source, i );
+        if (!accept) break;
+      }
+
+    acceptArray.push_back ( accept );
+  }
+}
```
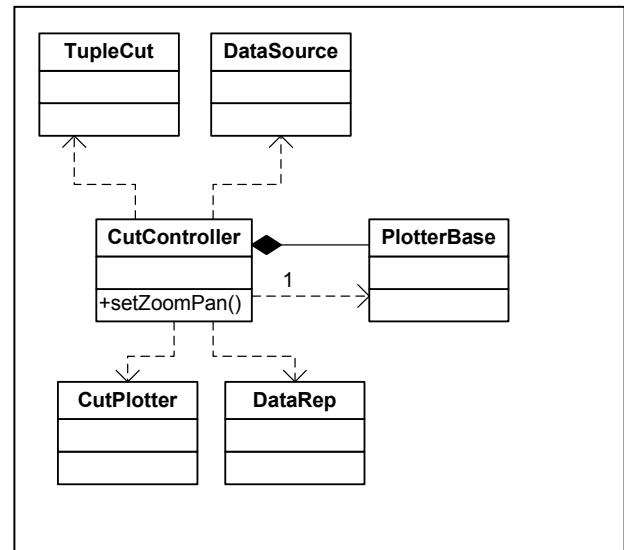

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

8

Case 7:

--- ../HippoDraw-1.18.1/datareps/DataRepFactory.cxx   2006-06-07 15:44:04.000000000 -0400
+++ ../HippoDraw-1.19.1/datareps/DataRepFactory.cxx   2006-09-14 15:46:24.000000000 -0400

```
@@ -30,11 +30,12 @@
 #include "St1DHistogram.h"
 #include "St2DHistogram.h"
 #include "StripChart.h"
+#include "VariableMesh.h"
 #include "XYPlot.h"
 #include "XYZPlot.h"
 #include "YPlot.h"

-namespace hippodraw {
+using namespace hippodraw;

 DataRepFactory * DataRepFactory::s_instance = 0;

@@ -56,7 +57,6 @@
   return s_instance;
 }

-// using namespace hippodraw;

 void DataRepFactory::initialize ()
 {
@@ -73,9 +73,8 @@
   add ( new St1DHistogram () );
   add ( new St2DHistogram () );
   add ( new StripChart () );
+  add ( new VariableMesh () );
   add ( new XYPlot () );
   add ( new XYZPlot () );
   add ( new YPlot () );
 }
-
-} // namespace hippodraw
```
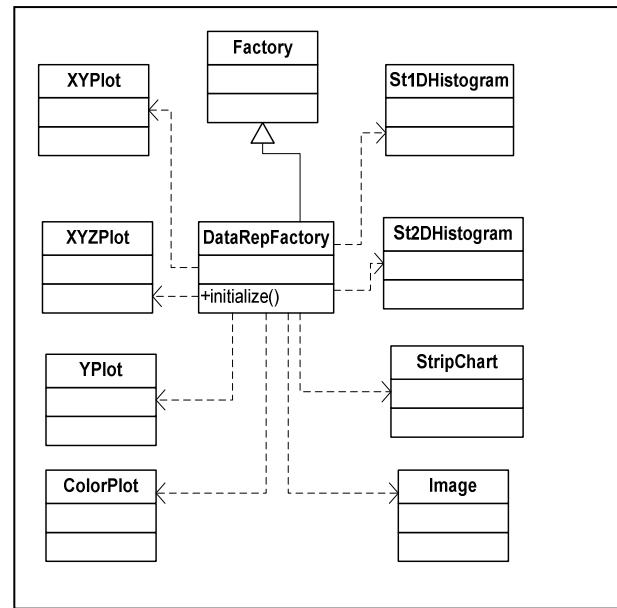

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

         9

Case 8:
--- ../HippoDraw-1.18.1/graphics/DataView.cxx
+++ ../HippoDraw-1.19.1/graphics/DataView.cxx

```
 #include "DataView.h"
+#include "graphics/FontBase.h"

 #include "axes/Range.h"
 #include "plotters/PlotterBase.h"

  float marginXLeft = draw.getHeight () * 0.20;
  marginXLeft = std::min ( marginXLeft, 55.0f );
-
  float marginXRight = 20.0 ;
- float marginYTop = 30.0;
- float marginYBottom = 30.0 ;

+ // Get a pointer to the plotter.
+ PlotterBase* plotter = getPlotter();
+
+ // Set and adjust top margin
+ float marginYTop = 30.0;
  if ( m_plotter -> hasAxis ( Axes::Z) )
   {
     marginYTop = 70.0;
   }
+ const FontBase* titlefont = plotter->titleFont();
+ if (titlefont) {
+   marginYTop = marginYTop+titlefont->pointSize()-9.0;
+ }
+ const FontBase* zfont = plotter->labelFont(Axes::Z);
+ if (zfont) {
+   marginYTop = marginYTop+zfont->pointSize()-7.0;
+ }
+
+ // Set and adjust bottom margin
+ float marginYBottom = 34.0 ;
+ const FontBase* labelfont = plotter->labelFont(Axes::X);
+ if (labelfont) {
+   marginYBottom = marginYBottom+labelfont->pointSize()-11.0;
+ }
+
```
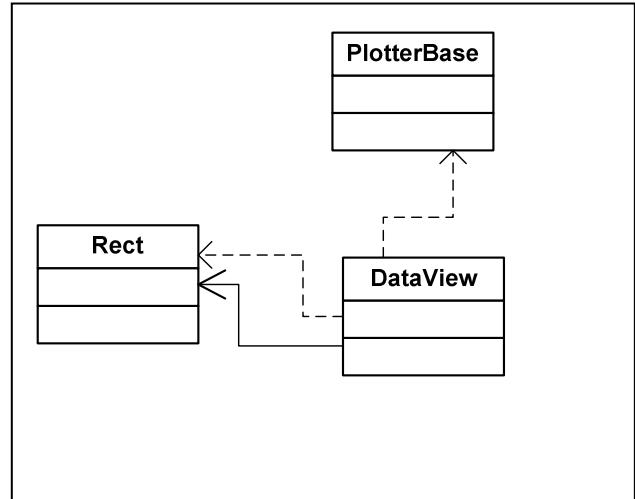

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 9:

--- ../HippoDraw-1.18.1/projectors/DyHist1DProjector.cxx   2006-06-23 18:09:34.000000000 -0400
+++ ../HippoDraw-1.19.1/projectors/DyHist1DProjector.cxx   2006-09-28 09:03:30.000000000 -0400

```
@@ -192,14 +192,15 @@
    // Get the range.
    const Range & r = m_y_axis->getRange(false);

-   double min = r.low()  * m_y_axis->getScaleFactor();
-   double max = r.high() * m_y_axis->getScaleFactor();
+   double scale_factor = m_y_axis -> getScaleFactor ();
+   double min = r.low()  * scale_factor;
+    double max = r.high() * scale_factor;

    const vector < double > & values
     = m_proj_values -> getColumn ( dp::Y );

    for ( unsigned int i = 0; i < values.size(); i++ ) {
-     double val = values[i];
+     double val = values[i] * scale_factor;
    // Add value to sum if its within the range.
    if(val >= min && val <= max){
        sum += val;
```
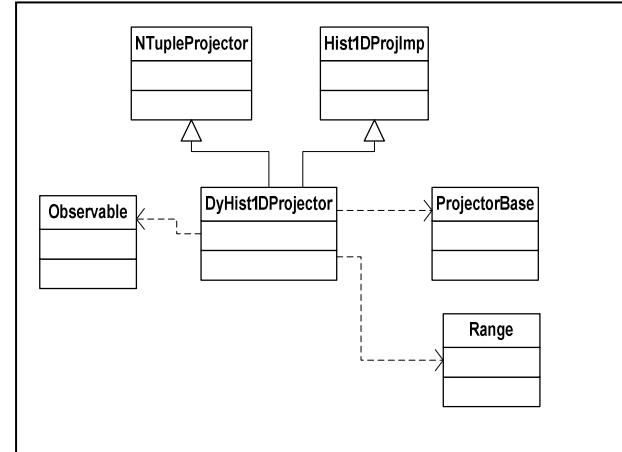

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 10:

```
---   ../HippoDraw-1.18.1/qt/FigureEditor.cxx      2006-08-25 18:03:26.000000000 -0400
+++ ../HippoDraw-1.19.1/qt/FigureEditor.cxx      2006-12-07 15:46:44.000000000 -0500

FigureEditor::
 maximumZ () const
 {
+ /* This is only used to determine if the view is a text view */
+ QtView* view = NULL;
+
 #if QT_VERSION < 0x040000
   vector < QCanvasItem * > ::const_iterator first = m_items.begin();
- double max_z = (*first++) -> z ();
+ double max_z = (*first) -> z ();
+
+ /* Get z()-100 for text plotter */
+ view = dynamic_cast<QtView*> (*first);
+ if (view && view->isTextView())
+   max_z -= 100;
+
+ first++;
+
+
   while ( first != m_items.end () ) {
-   QCanvasItem * item = *first++;
+   QCanvasItem * item = *first;
 #else
   vector < Q3CanvasItem * > ::const_iterator first = m_items.begin();
- double max_z = (*first++) -> z ();
+ double max_z = (*first) -> z ();
+
+ /* z()-100 for text */
+ view = dynamic_cast<QtView*> (*first);
+ if (view && view->isTextView())
+   max_z -= 100;
+
+ first++;
+
   while ( first != m_items.end () ) {
-   Q3CanvasItem * item = *first++;
+   Q3CanvasItem * item = *first;
 #endif
    double z = item -> z ();
+
+   /* z()-100 for text */
+   view = dynamic_cast<QtView*> (item);
+   if (view && view->isTextView())
+     z -= 100;
+
+
+   first++;
```
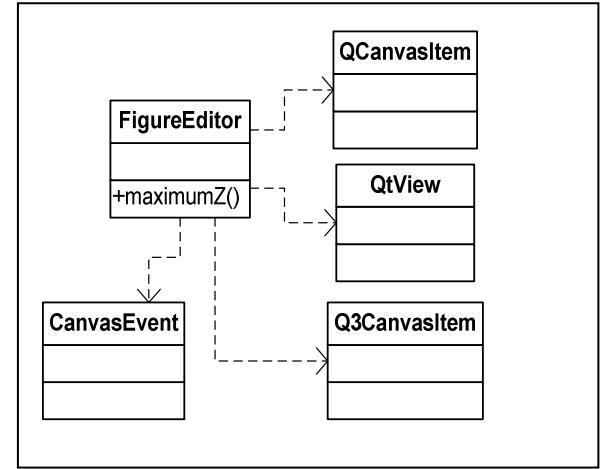
```
+
    max_z = std::max (max_z, z);
  }

@@ -575,6 +604,18 @@
 #else
      const Q3CanvasItem * item = ce -> item ();
 #endif
+   makeVisible (item);
+   }
+}
+void
+ FigureEditor::
+#if QT_VERSION < 0x040000
+ makeVisible (const QCanvasItem * item)
+#else
+ makeVisible (const Q3CanvasItem * item)
+#endif
+{
+ if (item != 0) {
      QRect rect = item->boundingRect ();
      int x = 0, y = 0, w = 0, h = 0;
      rect.rect(& x, & y, & w, & h);
@@ -600,6 +641,12 @@
  addSelectedItem (item);

  double z = maximumZ ();
+
+ /* SetZ for text plotter */
+ const QtView* view = dynamic_cast<const QtView*> (item);
+ if (view && view->isTextView())
+   item->setZ(z + 101.0);   // ensures it is on top of other text plotters
+ else
   item -> setZ (z + 1.0); // ensures it is on top

  notifyObservers ();
@@ -613,9 +660,12 @@
 ensureVisible (const Q3CanvasItem * item)
 #endif
 {
+#ifdef _MSC_VER
 CanvasEvent * event = new CanvasEvent (item);
-
 qApp -> postEvent (this, event);
+#else
+ makeVisible (item);
+#endif
 }

 void
@@ -767,10 +817,12 @@
```
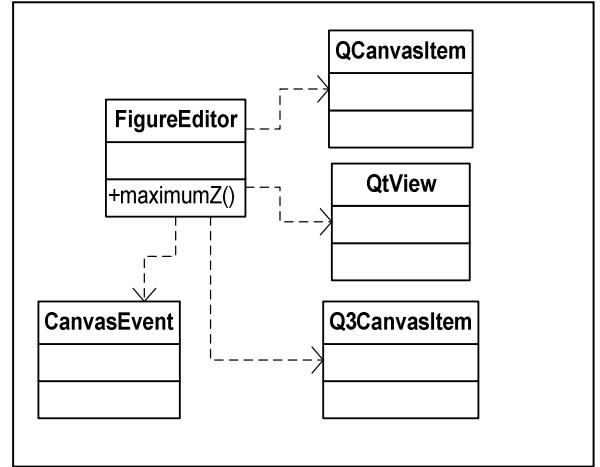
```
   if (e->button() == Qt::LeftButton)
    {

+   // Shift click is used to select multiple items when not in zoom mode.
+
 #if QT_VERSION < 0x040000
-     if (e->state() == Qt::ShiftButton)
+   if ((e->state() == Qt::ShiftButton) && (!getZoomMode()))
 #else
-     if (e -> modifiers () & Qt::ShiftModifier)
+   if ((e -> modifiers () & Qt::ShiftModifier) &&(!getZoomMode()))
 #endif
    {
      if (selItem -> isSelected ()) {
@@ -832,7 +884,14 @@
      e->state() == Qt::RightButton)
   {
    double z = maximumZ ();
-   selItem -> setZ (z + 1.0);
+
+   /* SetZ for text plotter */
+   const QtView* view = dynamic_cast<const QtView*> (selItem);
+   if (view && view->isTextView())
+   selItem->setZ(z + 101.0);   // ensures it is on top of other text plotters
+   else
+   selItem -> setZ (z + 1.0); // ensures it is on top
+
    m_rightItem = selItem;
   }
 }
```
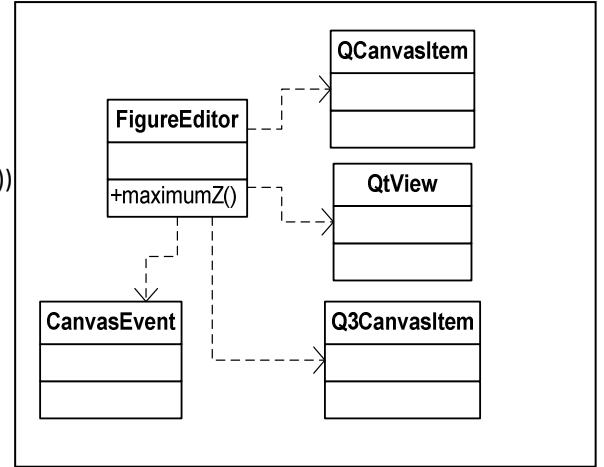


**Does this change add/delete……..in this UML class diagram:**

**Classes:** *YES   NO*          **Relationships:** *YES   NO*          **Methods** *YES   NO*

**IF YES what are the changes?**

**Case 11:**
--- ../HippoDraw-1.18.1/fits/FitsFile.h
+++ ../HippoDraw-1.19.1/fits/FitsFile.h

- int fillFromTableColumn ( std::vector < double > & vec,
+ int fillFromTableColumn ( std::vector < double > & v,
                            int column );


- int fillDoubleVectorFromColumn ( std::vector < double > &vec, int column );
+ int fillDoubleVectorFromColumn ( std::vector < double > &vec,
+                                  int column );

  int fillAxisSizes ( std::vector < long > & vec ) const;

+ void fillShape ( std::vector < int > & shape, int column );
+

- void writeHDU ( long row, int column,
-                 std::vector < std::string > names,
-                 std::vector < std::string > forms,
-                 std::vector < std::string > units,
-                 std::string extname );
+ void writeHDU ( long rows, int columns,
+                 const std::vector < std::string > & names,
+                 const std::vector < std::vector < int > > & shapes,
+                 const std::string & extname );

  void writeImageHDU ( long x, long y );

- void writeColumn ( int col, long row, std::vector < double > data );

+ void writeColumn ( int c, const std::vector < double > & data );

- void writePix ( long x, long y, std::vector <double > data );
+ void writePix ( long x, long y,
+                 const std::vector <double > & data );
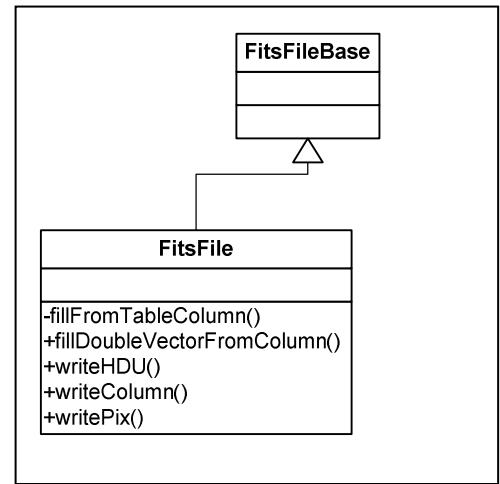
```
                                    ┌──────────────────────────┐
                                    │      FitsFileBase         │
                                    ├──────────────────────────┤
                                    │                          │
                                    ├──────────────────────────┤
                                    │                          │
                                    └──────────────────────────┘
                                              △
                                              │
                                    ┌──────────────────────────┐
                                    │         FitsFile          │
                                    ├──────────────────────────┤
                                    │                          │
                                    ├──────────────────────────┤
                                    │ -fillFromTableColumn()    │
                                    │ +fillDoubleVectorFromColumn()│
                                    │ +writeHDU()               │
                                    │ +writeColumn()            │
                                    │ +writePix()               │
                                    └──────────────────────────┘
```

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 12:
--- ../HippoDraw-1.18.1/controllers/FunctionController.h   2006-01-28 19:08:08.000000000 -0500
+++ ../HippoDraw-1.19.1/controllers/FunctionController.h 2006-10-13 08:54:04.000000000 -0400

  /** Clears and fills the vector with the top level FunctionRep
-    objects that target @a drep and are contained in @a plotter. A
-    top level FunctionRep object is one that is not a member of a
+   objects that target @a data_rep and are contained in @a plotter.
+   A top level FunctionRep object is one that is not a member of a
    CompositeFunctionRep.
   */
  void fillTopLevelFunctionReps (std::vector < FunctionRep * > & reps,
                                  const PlotterBase * plotter,
-                                 const DataRep * drep) const;
+   const DataRep * data_rep) const;

  /** Returns the CompositeFunctionRep for which @a rep is a member if
     it is one, otherwise returns rep. */
@@ -177,7 +177,7 @@
                                  const std::string & name);

  /** Adds the function named by the string to the designated DataRep
-    @a drep contained in the @a plotter. If @a frep is not a null
+   @a data_rep contained in the @a plotter. If @a frep is not a null

  FunctionRep * addFunction (PlotterBase * plotter,
                              const std::string & name,
                              FunctionRep * frep,
-                             DataRep * drep);
+   DataRep * data_rep);

-    @request Should save parameters in a stack, so that more than
-    one set can be saved and restored.
+   @request @@@@ Should save parameters in a stack, so that more
+   than one set can be saved and restored.
   */
  void saveParameters (PlotterBase * plotter);
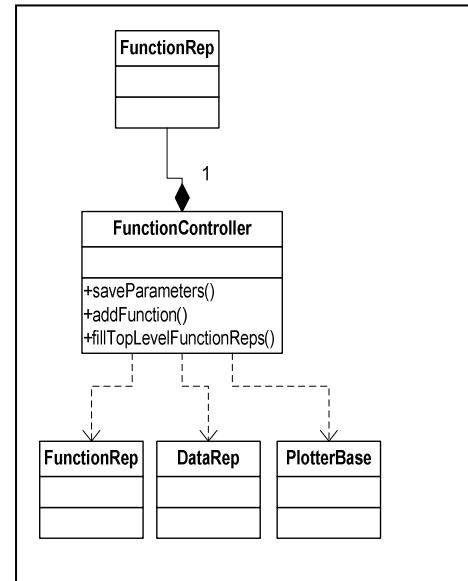
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 13:

--- ../HippoDraw-1.18.1/datasrcs/NTuple.h   2006-02-25 17:57:50.000000000 -0500
+++ ../HippoDraw-1.19.1/datasrcs/NTuple.h   2006-10-05 09:32:44.000000000 -0400

```
  /** Adds a row to the end of the ntuple.  If the size of the input
     vector is the same as the width of the ntuple, adds the row to
     the end of the ntuple and notifies its Observer objects.
-    Otherwise, throws a DataSourceException object.
+    Otherwise, throws a std::runtime_error object.
   */
  virtual void addRow ( const std::vector<double> & v );

@@ -185,29 +185,20 @@
     vector to then end of the NTuple. Gives the column the label @a
     label.  Returns the index of the newly created column.  If the
     size of the input vector differs from the size of existing
-    columns, then throws a DataSourceException object.
+    columns, then throws a std::runtime_error object.
   */
- int addColumn ( const std::string &,
+ virtual int addColumn ( const std::string &,
                   const std::vector < double > & column );

-    the sizes differ, then throws a DataSourceException object.
+    the sizes differ, then throws a std::runtime_error object.
   */
- void replaceColumn ( unsigned int index,
+ virtual void replaceColumn ( unsigned int index,
                   const std::vector< double > & data );

- /** Replaces the column.  Replaces the column at the column with
-    label @a label.  This is a convenience member function for using
-    indexOf() and replaceColumn ( unsigned int, const std::vector<
-    double > & ).
- */
- void replaceColumn ( const std::string & label,
-                   const std::vector < double > & data );
```
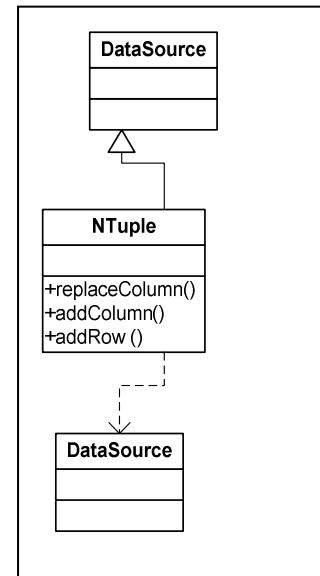

Does this change add/delete……..in this UML class diagram:

Classes: *YES NO*   **Relationships:** *YES NO*   **Methods** *YES NO*

IF YES what are the changes?

         17

Case 14:

--- ../HippoDraw-1.18.1/plotters/PlotterBase.cxx   2006-06-20 17:23:48.000000000 -0400
+++ ../HippoDraw-1.19.1/plotters/PlotterBase.cxx   2006-12-07 15:46:44.000000000 -0500
+void
+PlotterBase::
+setBoxEdge(bool flag)
+{
+}
+
+bool
+PlotterBase::
+getBoxEdge()
+{
+ return false;
+}
+

+const FontBase *
+PlotterBase::
+titleFont( ) const
+{
+ return NULL;
+}
+FontBase*
+PlotterBase::
+labelFont (hippodraw::Axes::Type axes) const
+{
+ return NULL;
+}
+
+bool
+PlotterBase::
+isImageConvertable () const
+{
+ return false;
+}
+bool
+PlotterBase::
+isTextPlotter() const
+{
+ return false;
+}
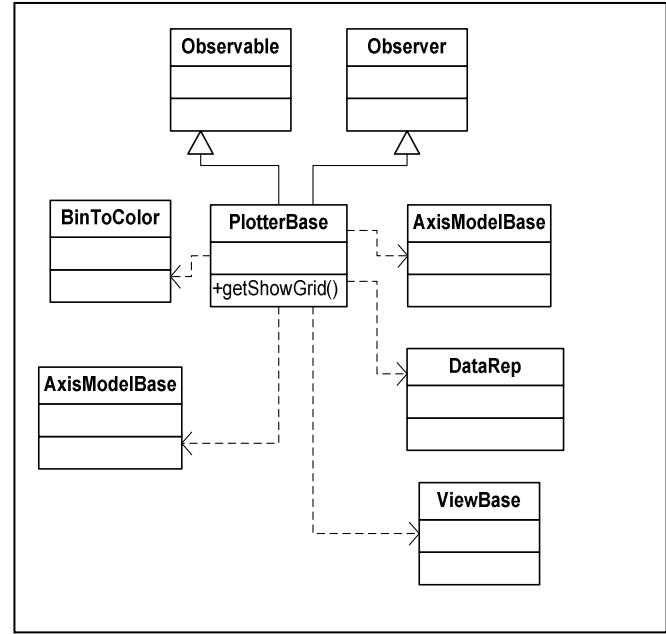
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 15:

--- ../HippoDraw-1.18.1/projectors/ProfileProjector.cxx   2005-09-12 12:55:12.000000000 -0400
+++ ../HippoDraw-1.19.1/projectors/ProfileProjector.cxx   2006-12-07 15:46:44.000000000 -0500

```
+#include <stdio.h>
+
 ProfileProjector::ProfileProjector( )
   : BinningProjector ( 1 ),
-   NTupleProjector ( 2 )
+   NTupleProjector ( 3 )
 {
   m_binding_options.push_back ( "X" );
   m_binding_options.push_back ( "Y" );
+  m_binding_options.push_back ( "Weight (optional)" );
   m_min_bindings = 2;

   BinnerAxisFactory * binner_factory = BinnerAxisFactory::instance ();
@@ -87,6 +90,7 @@
   unsigned int cols = m_ntuple->columns () - 1;
   if ( m_columns[0] > cols ) m_columns[0] = cols;
   if ( m_columns[1] > cols ) m_columns[1] = cols;
+  if ( m_columns[2] > cols ) m_columns[2] = cols;

   // Get the data and the optional weight column.
   unsigned int & x_col = m_columns[0];
   unsigned int & y_col = m_columns[1];
+  unsigned int & w_col = m_columns[2];
   unsigned int size = m_ntuple -> rows ();

+  bool have_weight = w_col < UINT_MAX;
+

-    m_binner->accumulate( x, y );
+    double w = 1.0;
+    if ( have_weight) {
+  w = m_ntuple -> valueAt ( i, w_col );
+    }
+    m_binner->accumulate( x, y, w );
   }
 }
```
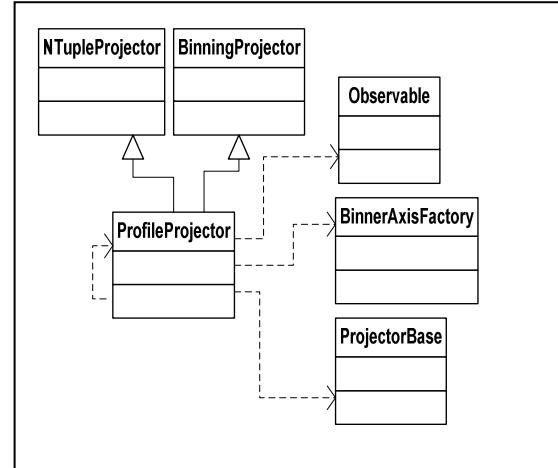

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 16:

--- ../HippoDraw-1.18.1/python/PyCanvas.cxx   2006-08-12 16:17:08.000000000 -0400
+++ ../HippoDraw-1.19.1/python/PyCanvas.cxx   2006-12-08 14:17:44.000000000 -0500

```
 #include "controllers/DisplayController.h"
 #include "controllers/FunctionController.h"
-#include "datasrcs/DataSourceException.h"
 #include "datasrcs/NTuple.h"
 #include "pattern/FactoryException.h"
 #include "plotters/Cut1DPlotter.h"
@@ -33,6 +33,7 @@

 #include <stdexcept>

+using std::runtime_error;
 using std::string;

 using namespace hippodraw;
   m_canvas_proxy = new CanvasViewProxy ( view );
 }

PyCanvas::PyCanvas ( )
  : m_canvas (0),
    m_canvas_proxy (0),
    m_has_gui ( false )
 {
+ PyApp::lock();
+
+ m_canvas = new CanvasWindow ();
+ CanvasView * view = m_canvas -> getCanvasView ();
+ m_canvas_proxy = new CanvasViewProxy ( view );
+
+ PyApp::unlock ();
 }

 PlotterBase * plotter = display_wrap->display();
+#ifndef _MSC_VER
+    while ( PyApp::hasPendingEvents () ) {}
+#endif
   m_canvas_proxy -> addDisplay ( plotter );
  }
  else {
@@ -124,6 +138,7 @@
 QtDisplay * PyCanvas::getDisplay ()
 {
  check();
+
  PyApp::lock();
  QtDisplay * display = 0;
   PlotterBase * plotter = m_canvas->selectedPlotter();
@@ -210,20 +225,21 @@
```
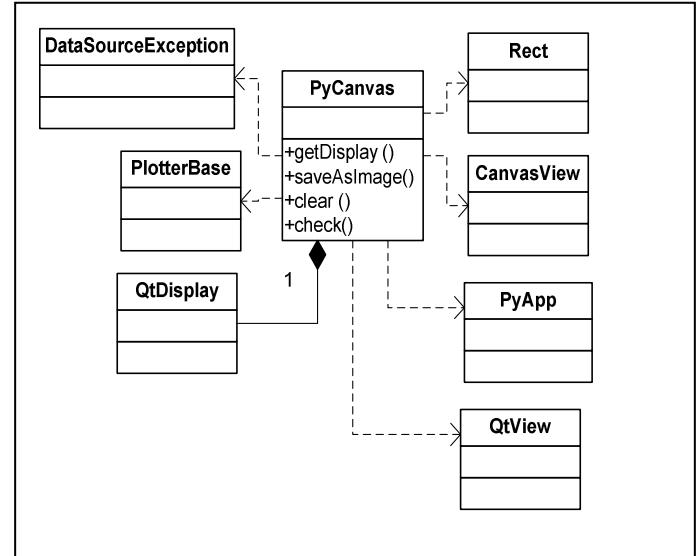
```
 */
 void PyCanvas::saveAsImage( QtDisplay * display, const std::string &filename )
 {
- check();
+// check();
   // Ensure that a suffix is provided...
   std::string::size_type i = filename.find_last_of( '.' );
   if ( i == std::string::npos ) {
     const std::string
       what ( "PyCanvas::saveAsImage: filename suffix missing." );
     PyApp::unlock ();
-     throw DataSourceException( what );
+     throw runtime_error( what );
   }
   QtView * selectedView = findSelectedView( display );
   if ( selectedView ) {
     std::string file = filename;
     PlotterBase * plotter = selectedView->getPlotter();
+//     while ( PyApp::hasPendingEvents () ) {}
     m_canvas_proxy -> saveAsImage ( plotter, filename );
   }
 }
-     throw DataSourceException( what );
+     throw runtime_error( what );
   }
   m_canvas->fileSaveSelectedImages ( filename );
   PyApp::unlock ();
@@ -373,6 +389,8 @@
 clear ()
 {
   check();
+//   while ( PyApp::hasPendingEvents () ) {}
+
   m_canvas_proxy -> clear ();
 }
@@ -414,9 +432,9 @@
   const PlotterBase * plotter = display -> display ();
   QtView * view = m_canvas -> getViewFor ( plotter );
   if ( view != 0 ) {
-   int w = view -> width ();
-   int hh = static_cast < int > ( h );
-   view -> setSize ( w, hh );
+   Rect rect = view -> getDrawRect ();
+   view -> setDrawRect ( rect.getX(), rect.getY(),
+                          rect.getWidth(), h );
```
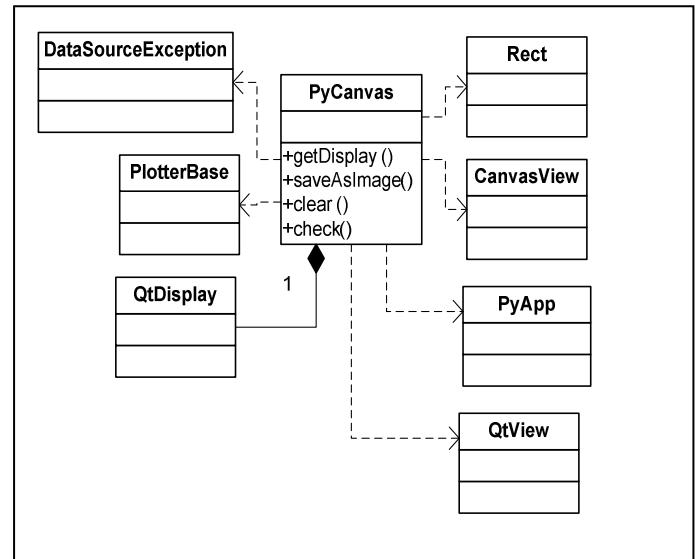
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods** *YES   NO*

IF YES what are the changes?

Case 17:
--- ../HippoDraw-1.18.1/python/PyFitsController.h
+++ ../HippoDraw-1.19.1/python/PyFitsController.h

-$Id: PyFitsController.h,v 1.5 2006/08/24 19:12:07 pfkeb Exp $
+$Id: PyFitsController.h,v 1.8 2006/09/06 17:24:27 pfkeb Exp $

  class FitsController;
  class FitsNTuple;
  class PyDataSource;
+ class QtCut;

  void writeToFile (const PyDataSource * source,
                     const std::string & filename);

+ /** Writes a copy of the DataSource @a source to a file. Write to a
+   file a copy of the DataSource with only columns in the
+   @a column_list and rows passing all the cuts in the @a cut_list.
+ */
+ void writeToFile (const DataSource * source,
+   const std::string & filename,
+   const std::vector < QtCut * > & cut_list,
+   const std::vector < std::string > & column_list);
+
+ /** Writes a copy of the PyDataSource @a source to a file, Write to
+   a file a copy of the DataSource with only columns in the
+   @a column_list and rows passing all the cuts in the @a cut_list.
+ */
+ void writeToFile (const PyDataSource * source,
+   const std::string & filename,
+   const std::vector < QtCut * > & cut_list,
+   const std::vector < std::string > & column_list);
+
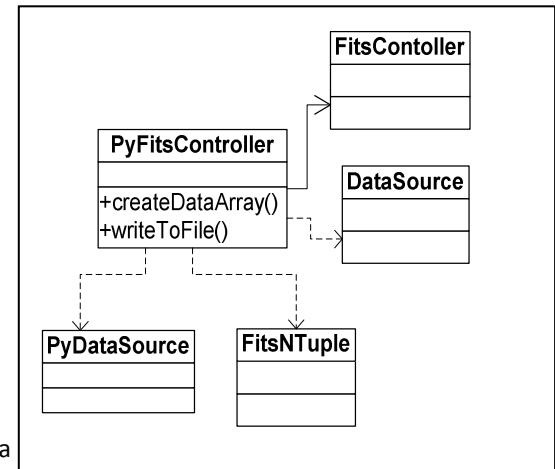
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 18:

```
-// include first to avoid warning: "_POSIX_C_SOURCE" redefined messages
-#include "PyDataSource.h"
-
 #include "PyNTupleController.h"

+#include "PyApp.h"
+#include "PyDataSource.h"
+#include "PyNTuple.h"

 #include "datasrcs/DataSourceController.h"
 #include "datasrcs/NTupleController.h"
-#include "datasrcs/NTuple.h"
+
+#include <stdexcept>

 using namespace hippodraw;

@@ -60,15 +61,9 @@
 PyNTupleController::
 createNTuple ( )
 {
-  NTuple * ntuple = 0;
-
-  try {
-    DataSource * source = m_instance -> createNTuple ();
-    ntuple = dynamic_cast < NTuple * > ( source );
-  }
-  catch ( const DataSourceException & e ) {
-    throw e;
-  }
+  PyNTuple * ntuple = new PyNTuple ();
+  DataSourceController * controller = DataSourceController::instance ();
+  controller -> registerNTuple ( ntuple );

   return ntuple;
 }
@@ -77,16 +72,21 @@
 PyNTupleController::
 createNTuple ( const std::string & filename )
 {
-  DataSource  * source = 0;
+  PyApp::lock ();
+  unsigned int columns = 0;
+  PyNTuple * ntuple = new PyNTuple ( columns );

   try {
-    source = m_instance -> createNTuple ( filename );
```
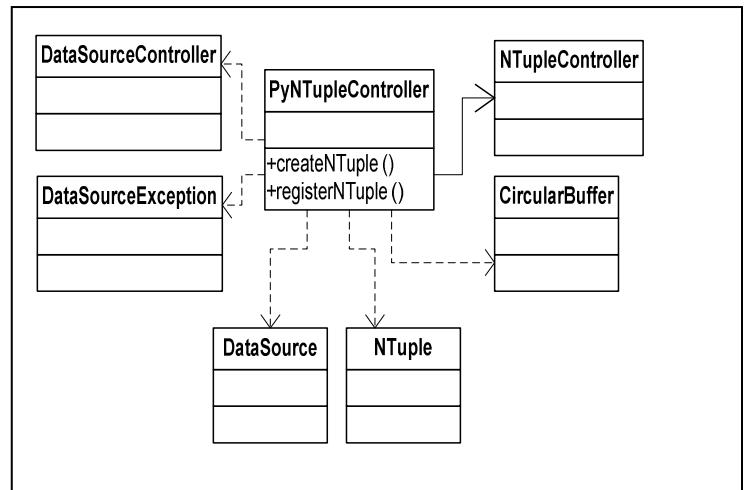
```
+    m_instance -> fillFromFile ( filename, ntuple );
  }
- catch ( const DataSourceException & e ) {
+ catch ( const std::runtime_error & e ) {
+    PyApp::unlock ();
+    delete ntuple;
    throw e;
  }
+ PyApp::unlock ();

- return source;
+ return ntuple;
 }

 CircularBuffer *
@@ -119,9 +119,13 @@
 PyNTupleController::
 registerNTuple ( DataSource * source )
 {
+ PyApp::lock ();
  DataSourceController * dsc = DataSourceController::instance ();

- return dsc -> registerNTuple ( source );
+ std::string name = dsc -> registerNTuple ( source );
+ PyApp::unlock ();
+
+ return name;
```
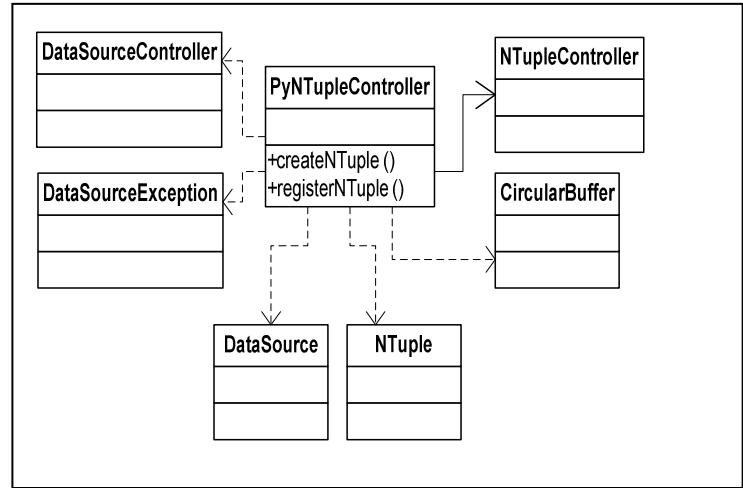

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 19:
--- ../HippoDraw-1.18.1/python/QtCut.cxx
+++ ../HippoDraw-1.19.1/python/QtCut.cxx

- fc->createNTupleToFile(column_list, tuple_cut_list, ds, filename, dsname);
+ fc -> writeNTupleToFile(ds, filename, dsname, column_list, tuple_cut_list);

   PyApp::unlock();
 #else
@@ -301,3 +301,16 @@
 #endif

 }
+
+void
+QtCut::
+fillCutList (std::vector < const TupleCut *> & tuple_cut_list,
+   const std::vector < QtCut * > & cut_list)
+{
+ std::vector < QtCut * >::const_iterator it = cut_list.begin();
+ for (; it !=cut_list.end(); ++it)
+   {
+   QtCut * cut = *it;
+   cut -> m_plotter-> fillCutList (tuple_cut_list);
+   }
+}
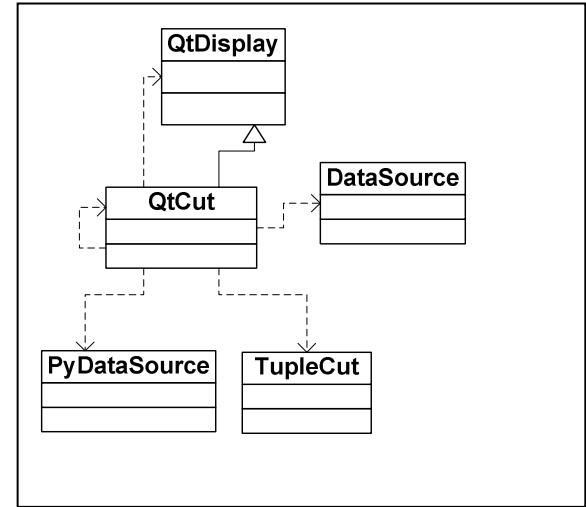
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 20:

--- ../HippoDraw-1.18.1/root/RootController.h   2006-08-24 18:58:16.000000000 -0400
+++ ../HippoDraw-1.19.1/root/RootController.h   2006-09-21 17:58:48.000000000 -0400

-#include "pattern/libhippo.h"
+#include "pattern/Observer.h"

 #include <map>
 #include <string>

-class MDL_HIPPOPLOT_API RootController
+ class MDL_HIPPOPLOT_API RootController : private Observer
 {

 private:
@@ -51,6 +51,14 @@
  /** The list of opened ROOT files. */
  std::map < std::string, TFile * > m_file_map;

+ typedef std::map < const DataSource *, std::string > TupleToFileMap_t;

+ TupleToFileMap_t m_tuple_map;
+

  std::vector < std::string > m_ntuple_names;
  DataSource * createNTuple (const std::string & filename,
                             const std::string & treename);

+ DataSource * initNTuple (DataSource * source,
+   const std::string & filename,
+   const std::string & treename);
+
+ void fillDimSize (std::vector < int > & dims,
+   const DataSource * source,
+   const std::string & column);

+ virtual void update (const Observable *);
+ virtual void willDelete (const Observable * obs);
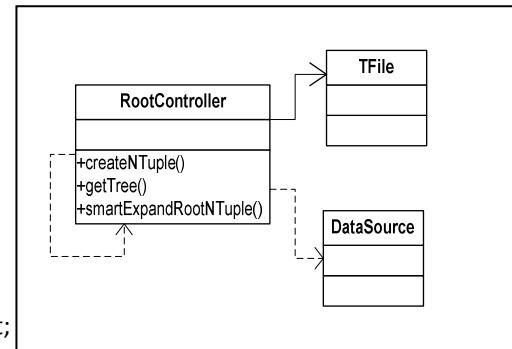
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 21:

--- ../HippoDraw-1.18.1/root/RootNTuple.h   2006-08-27 19:13:54.000000000 -0400
+++ ../HippoDraw-1.19.1/root/RootNTuple.h   2006-10-05 09:32:46.000000000 -0400

```
+ typedef std::vector < RootBranch * > BranchList_t;
+
- std::vector < RootBranch * > m_data;
+ BranchList_t m_data;

+ typedef std::vector < std::vector < double > * > CacheList_t;

- std::vector < std::vector < double > * > m_data_cache;
+ CacheList_t m_data_cache;

-    DataSourceException object.
+     std::runtime_error object.

- double * doubleArrayAt ( unsigned int row, unsigned int column ) const;
+ virtual double * doubleArrayAt ( unsigned int row,
+                                  unsigned int column ) const;

- float * floatArrayAt ( unsigned int row, unsigned int column ) const;
+ virtual float * floatArrayAt ( unsigned int row,
+                                 unsigned int column ) const;

- int * intArrayAt ( unsigned int row, unsigned int column ) const;
+ virtual int * intArrayAt ( unsigned int row,
+                            unsigned int column ) const;

- unsigned int * uintArrayAt ( unsigned int row, unsigned int column ) const;
+ virtual unsigned int * uintArrayAt ( unsigned int row,
+                                      unsigned int column ) const;

- void replaceColumn ( const std::string & label,
-                     const std::vector < double > & data );
-
- const std::vector < int > & getColumnShape ( const std::string &
-                                            column ) const;
-
- virtual  const std::vector < int > & getColumnShape ( unsigned int ) const;
+ virtual void fillShape ( std::vector < int > & v,
+                          unsigned int column ) const;
```
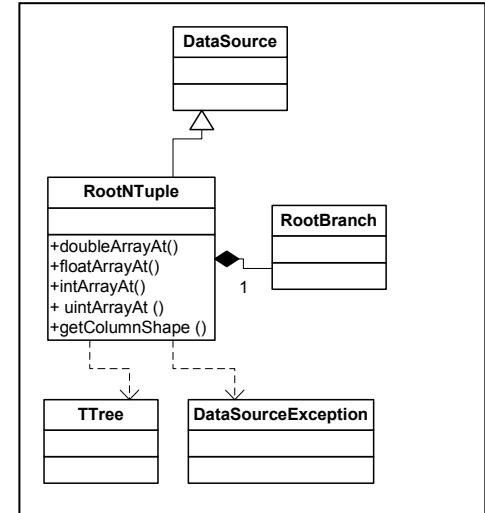

Does this change add/delete……..in this UML class diagram:

Classes: *YES NO*   **Relationships:** *YES NO*   **Methods:** *YES NO*

IF YES what are the changes?

Case 22:

--- ../HippoDraw-1.18.1/datareps/VariableMesh.h   2008-11-19 14:23:37.000000000 -0500
+++ ../HippoDraw-1.19.1/datareps/VariableMesh.h   2006-11-24 12:52:30.000000000 -0500

+hippodraw::VariableMesh classes interface.
+
+Copyright (C) 2006   The Board of Trustees of The Leland
+Stanford Junior University. All Rights Reserved.
+
+$Id: VariableMesh.h,v 1.51 2006/11/22 01:35:51 xiefang Exp $
+
+*/
+
+#ifndef _VariableMesh_H_
+#define _VariableMesh_H_
+
+#include "datareps/DataRep.h"
+
+namespace hippodraw {
+
+/** Displays X Y mesh.
+
+   @author Paul F. Kunz <Paul_Kunz@slac.stanford.edu>
+*/
+
+class MDL_HIPPOPLOT_API VariableMesh
+ : public hippodraw::DataRep
+{
+ public:
+
+ /** The default constructor. */
+ VariableMesh ( );
+
+ /** The clone function returns an object of its own kind which
+   is a copy of this object at this moment. */
+ virtual DataRep * clone();
+
+ bool acceptFunction (int num);
+
+ /** Returns @c true. Returns @c true PointRep class used by
+   this class are capable of displaying error on the data points.
+ */
+ virtual bool hasErrorDisplay () const;
+
+ /** Sets the point representation. Sets the point representation to
+   @ point_rep as DataRep::setRepresentation does. Also sets the
+   error display if appropriate.
+ */
+ virtual void setRepresentation (RepBase * point_rep);
+
+ /** Sets the axis bindings. Sets binding of the axis with name axis
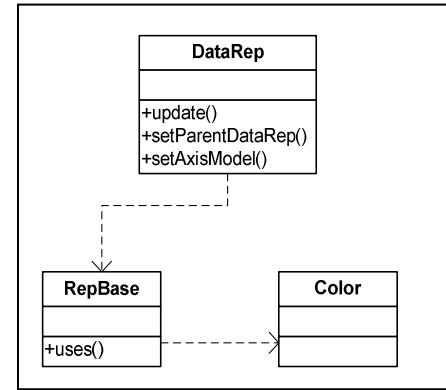
```
+    to the DataSource column with label label.
+ */
+ virtual void setAxisBinding ( const std::string & axis,
+                                const std::string & label );
+
+ /** Sets the axis bindings.  Sets binding all axes to the DataSource
+    column with label in the vector.  Also set the error display flag
+    in the SymbolPointRep.
+ */
+ virtual
+ void setAxisBindings ( const std::vector < std::string > & bindings );
+
+ virtual bool hasAxis ( hippodraw::Axes::Type ) const;
+
+};
+
+} // namespace hippodraw
+
+#endif // _VariableMesh
```
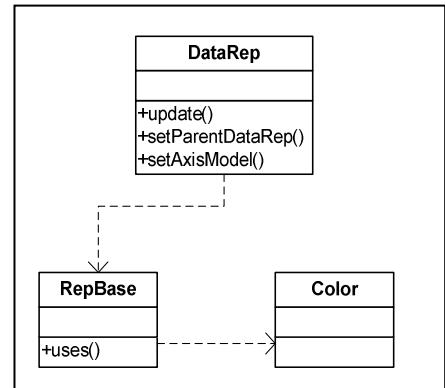

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 23:
--- ../HippoDraw-1.18.1/qt/WindowController.h   2006-06-01 13:18:50.000000000 -0400
+++ ../HippoDraw-1.19.1/qt/WindowController.h 2006-10-24 16:26:38.000000000 -0400

-WindowController class interface
+hippodraw::WindowController class interface

@@ -37,8 +37,6 @@
   HippoDraw. It can be used as a helper function to an
   application.

-       @bug @@@@@@ On Windows at least, Inspector comes up behind CanvasWindow.
-

@@ -102,10 +100,15 @@
  */
  void resizeCanvas (CanvasWindow * window);

- /** Positions the Inspector based on size of screen and width of
-    Inspector. */
+ /** Positions the Inspector as far right as possible based on size
+   of screen and width of Inspector.
+ */
  void positionInspector ();

+ /** Move the Inspector next to the edge of the Window.
+ */
+ void moveInspector (CanvasWindow * window);
+
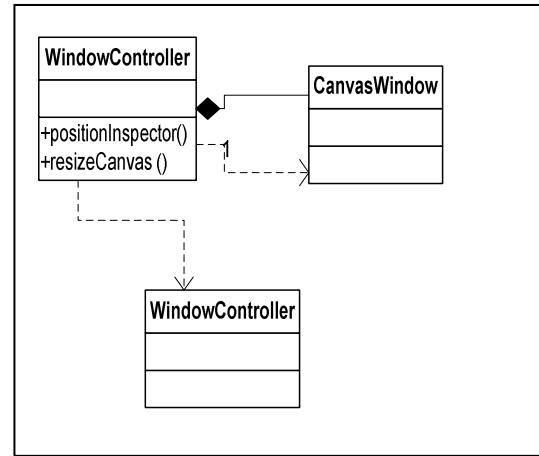
Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 24:

--- ../HippoDraw-1.18.1/plotters/XyPlotter.h   2006-06-20 17:23:48.000000000 -0400
+++ ../HippoDraw-1.19.1/plotters/XyPlotter.h   2006-10-24 16:26:36.000000000 -0400

 class AxisRepBase;
 class CompositePlotter;
-class FontBase;

  void prepareToDraw ();

+ bool m_need_update;

 protected:

- FontBase* labelFont (Axes::Type axes) const;
+ virtual FontBase* labelFont (Axes::Type axes) const;

  void setTitleFont(FontBase* font);

- const FontBase * titleFont ( ) const;
+ virtual const FontBase * titleFont ( ) const;

 virtual bool getShowGrid ();

+ virtual void setBoxEdge(bool flag);

+ virtual bool getBoxEdge();

  virtual void setTransform (TransformBase *);
  virtual int getMinEntries ();

+ void setNeedUpdate(bool isChanged);
+
+ virtual bool isImageConvertable () const;
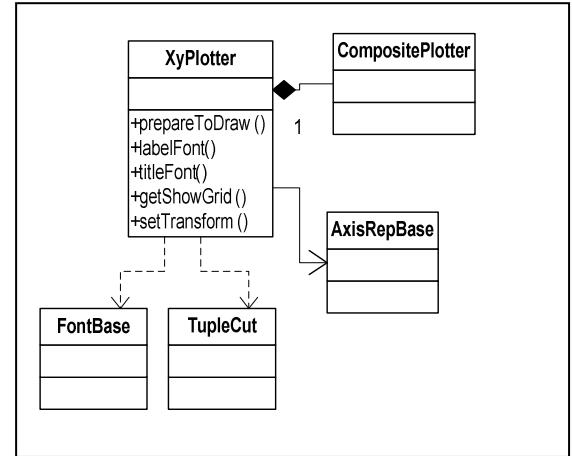
Does this change add/delete……..in this UML class diagram:

**Classes:** *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?

Case 25:
--- ../HippoDraw-1.18.1/python/PyDataSource.h   2006-05-13 17:49:38.000000000 -0400
+++ ../HippoDraw-1.19.1/python/PyDataSource.h 2006-10-05 09:32:46.000000000 -0400

-class PyDataSource {
+class PyDataSource
+{
+
+private:
+
+ void checkRank (boost::python::numeric::array array);
 public:
 PyDataSource (const std::string & name, DataSource * source);

- ~PyDataSource();
+   virtual ~PyDataSource();

@@ -145,6 +153,12 @@
   boost::python::numeric::array
   columnAsNumArray(unsigned int index) const;

+ /** Replaces or add column vector.
+ */
+ void saveColumn (const std::string & label,
+   const std::vector < double > & v,
+   const std::vector < int > & shape);
+
+ /** Replace or add a column from vector.
+ */
+ void saveColumnFrom (const std::string & label,
+   const std::vector < double > & array);
+
+ void addRow (const std::vector < double > & array);
+
+ void append (const DataSource * source);
+ void append (const PyDataSource * source);

Does this change add/delete……..in this UML class diagram:

Classes: *YES   NO*   **Relationships:** *YES   NO*   **Methods:** *YES   NO*

IF YES what are the changes?