Table1 The original class JEditTextArea in JEidt

| Original Class JEditTextArea | |
|---|---|
| Attributes | Methods |
| vertical | _addToSelection(Selection) |
| verticalBox | _finishCaretUpdate() |
| view | add(String, Component) |
| visibleLines | addCaretListener(CaretListener) |
| wrap | addExplicitFold() |
| BOTTOM | addFocusListener(FocusListener) |
| CENTER | addLeftOfScrollBar(Component) |
| ELECTRIC_SCROLL | addMarker() |
| LEFT | addMouseWheelListener(MouseWheelListener) |
| NORMAL_SCROLL | addNotify() |
| NO_SCROLL | addScrollListener(ScrollListener) |
| RIGHT | addStructureMatcher(StructureMatcher) |
| TOP | addToSelection(Selection) |
| blink | addToSelection(Selection[]) |
| buffer | addTopComponent(Component) |
| bufferChanging | backspace() |
| caret | backspaceWord() |
| caretBlinks | backspaceWord(boolean) |
| caretEvent | blinkCaret() |
| caretLine | centerCaret() |
| caretScreenLine | collapseFold() |
| caretTimer | delete() |
| charWidth | delete(boolean) |
| chunkCache | deleteLine() |
| dndCallback | deleteParagraph() |
| dndEnabled | deleteToEndOfLine() |
| dndInProgress | deleteToStartOfLine() |
| electricScroll | deleteWord() |
| focusedComponent | deleteWord(boolean) |
| gutter | displayManager |
| hardWrap | dispose() |
| horizontal | doWordCount(View, String) |
| horizontalOffset | doWordWrap(boolean) |
| lineSegment | enableEvents(long) |
| listenerList | expandFold(boolean) |
| magicCaret | extendSelection(int, int) |
| match | extendSelection(int, int, int, int) |
| maxHorizontalScrollWidth | finishCaretUpdate(boolean, boolean) |
| maxLineLen | fireCaretEvent() |
| mouseHandler | fireScrollEvent(boolean) |
| overwrite | foldStructureChanged() |

| | |
|---|---|
| painter | formatParagraph() |
| physLastLine | getBorder() |
| popup | getBuffer() |
| popupEnabled | getBufferLength() |
| queuedCaretUpdate | getCaretLine() |
| queuedFireCaretEvent | getCaretPosition() |
| queuedScrollToElectric | getDisplayManager() |
| quickCopy | getDragAndDropCallback() |
| trace | getDropTarget() |
| tabSize | getElectricScroll() |
| multi | getFirstLine() |
| lastLinePartial | getFirstPhysicalLine() |
| structureMatchers | getFocusCycleRoot() |
| structureTimer | getFocusTraversalKeysEnabled() |
| selection | getGutter() |
| | getHorizontalOffset() |
| | getLastPhysicalLine() |
| | getLineCount() |
| | getLineEndOffset(int) |
| | getLineLength(int) |
| | getLineOfOffset(int) |
| | getLineStartOffset(int) |
| | getLineText(int) |
| | getLineText(int, text.Segment) |
| | getMagicCaretPosition() |
| | getMarkLine() |
| | getMarkPosition() |
| | getPainter() |
| | getPhysicalLineOfScreenLine(int) |
| | getRectParams(int, int) |
| | getRightClickPopup() |
| | getScreenLineEndOffset(int) |
| | getScreenLineOfOffset(int) |
| | getScreenLineStartOffset(int) |
| | getSelectedLines() |
| | getSelectedText() |
| | getSelectedText(String) |
| | getSelectedText(Selection) |
| | getSelection() |
| | getSelectionAtOffset(int) |
| | getSelectionCount() |
| | getSelectionEnd() |
| | getSelectionEnd(int) |
| | getSelectionEndLine() |

| | getSelectionStart() |
| --- | --- |
| | getSelectionStart(int) |
| | getSelectionStartAndEnd(int, int, Selection) |
| | getSelectionStartLine() |
| | getStructureMatch() |
| | getText() |
| | getText(int, int) |
| | getText(int, int, text.Segment) |
| | getToolkit() |
| | getTransferHandler() |
| | getView() |
| | getVisibleLines() |
| | getWidth() |
| | goToBufferEnd(boolean) |
| | goToBufferStart(boolean) |
| | goToEndOfLine(boolean) |
| | goToEndOfWhiteSpace(boolean) |
| | goToFirstVisibleLine(boolean) |
| | goToLastVisibleLine(boolean) |
| | goToMarker(char, boolean) |
| | goToMatchingBracket() |
| | goToNextBracket(boolean) |
| | goToNextCharacter(boolean) |
| | goToNextFold(boolean) |
| | goToNextLine(boolean) |
| | goToNextMarker(boolean) |
| | goToNextPage(boolean) |
| | goToNextParagraph(boolean) |
| | goToNextWord(boolean) |
| | goToNextWord(boolean, boolean) |
| | goToParentFold() |
| | goToPrevBracket(boolean) |
| | goToPrevCharacter(boolean) |
| | goToPrevFold(boolean) |
| | goToPrevLine(boolean) |
| | goToPrevMarker(boolean) |
| | goToPrevPage(boolean) |
| | goToPrevParagraph(boolean) |
| | goToPrevWord(boolean) |
| | goToPrevWord(boolean, boolean) |
| | goToStartOfLine(boolean) |
| | goToStartOfWhiteSpace(boolean) |
| | handlePopupTrigger(MouseEvent) |
| | hasFocus() |

| | indentSelectedLines() |
|---|---|
| | insertEnterAndIndent() |
| | insertTab() |
| | insertTabAndIndent() |
| | insideSelection(int, int) |
| | invalidateLine(int) |
| | invalidateLineRange(int, int) |
| | invalidateScreenLineRange(int, int) |
| | invalidateSelectedLines() |
| | invertSelection() |
| | isCaretBlinkEnabled() |
| | isCaretVisible() |
| | isDragEnabled() |
| | isDragInProgress() |
| | isEditable() |
| | isMultipleSelectionEnabled() |
| | isOverwriteEnabled() |
| | isQuickCopyEnabled() |
| | isRectangularSelectionEnabled() |
| | isRightClickPopupEnabled() |
| | isSelectionRectangular() |
| | isShowing() |
| | isStructureHighlightVisible() |
| | joinLines() |
| | lineComment() |
| | lineInStructureScope(int) |
| | moveCaretPosition(int) |
| | moveCaretPosition(int, boolean) |
| | moveCaretPosition(int, int) |
| | narrowToFold() |
| | narrowToSelection() |
| | offsetToXY(int) |
| | offsetToXY(int, int, Point) |
| | processKeyEvent(KeyEvent) |
| | propertiesChanged() |
| | rangeComment() |
| | recalculateLastPhysicalLine() |
| | recalculateVisibleLines() |
| | rectangularSelectionMode |
| | remove(Component) |
| | removeCaretListener(CaretListener) |
| | removeFromSelection(int) |
| | removeFromSelection(Selection) |
| | removeLeftOfScrollBar(Component) |

| | |
|---|---|
| | removeNotify() |
| | removeScrollListener(ScrollListener) |
| | removeStructureMatcher(StructureMatcher) |
| | removeTopComponent(Component) |
| | removeTrailingWhiteSpace() |
| | repaint() |
| | requestFocus() |
| | resizeSelection(int, int, int, boolean) |
| | returnValue |
| | revalidate() |
| | screenLastLine |
| | scrollBarsInitialized |
| | scrollDownLine() |
| | scrollDownPage() |
| | scrollTo(int, boolean) |
| | scrollTo(int, int, boolean) |
| | scrollToCaret(boolean) |
| | scrollUpLine() |
| | scrollUpPage() |
| | select(int, int) |
| | select(int, int, boolean) |
| | selectAll() |
| | selectBlock() |
| | selectFold() |
| | selectFold(int) |
| | selectLine() |
| | selectNone() |
| | selectParagraph() |
| | selectToMatchingBracket() |
| | selectToMatchingBracket(int, boolean) |
| | selectWord() |
| | setBorder(border.Border) |
| | setBuffer(Buffer) |
| | setCaretBlinkEnabled(boolean) |
| | setCaretPosition(int) |
| | setCaretPosition(int, boolean) |
| | setDragAndDropCallback(reflect.Method) |
| | setDragEnabled(boolean) |
| | setDragInProgress(boolean) |
| | setElectricScroll(int) |
| | setFirstLine(int) |
| | setFirstPhysicalLine(int) |
| | setFirstPhysicalLine(int, int) |
| | setHorizontalOffset(int) |

| | |
|---|---|
| | setLayout(LayoutManager) |
| | setMagicCaretPosition(int) |
| | setMultipleSelectionEnabled(boolean) |
| | setOverwriteEnabled(boolean) |
| | setQuickCopyEnabled(boolean) |
| | setRectangularSelectionEnabled(boolean) |
| | setRightClickPopup(JPopupMenu) |
| | setRightClickPopupEnabled(boolean) |
| | setSelectedText(String) |
| | setSelectedText(String, boolean) |
| | setSelectedText(Selection, String) |
| | setSelection(Selection) |
| | setSelection(Selection[]) |
| | setSelectionEnd(int) |
| | setSelectionStart(int) |
| | setText(String) |
| | setTransferHandler(TransferHandler) |
| | shiftIndentLeft() |
| | shiftIndentRight() |
| | shiftTallCaretLeft(Selection$Rect) |
| | showGoToLineDialog() |
| | showSelectLineRangeDialog() |
| | showStructureStatusMessage(boolean) |
| | showWordCountDialog() |
| | smartEnd(boolean) |
| | smartHome(boolean) |
| | spacesToTabs() |
| | startDragAndDrop(InputEvent, boolean) |
| | swapMarkerAndCaret(char) |
| | tabsToSpaces() |
| | tallCaretDelete(Selection$Rect, boolean) |
| | toLowerCase() |
| | toUpperCase() |
| | toggleMultipleSelectionEnabled() |
| | toggleOverwriteEnabled() |
| | toggleRectangularSelectionEnabled() |
| | updateBracketHighlightWithDelay() |
| | updateMaxHorizontalScrollWidth() |
| | updateScrollBars() |
| | updateStructureHighlight() |
| | userInput(char) |
| | xToScreenLineOffset(int, int, boolean) |
| | xyToOffset(int, int) |
| | xyToOffset(int, int, boolean) |

Table2 The new classes extracted by developers

| Class Extracted by the Developers - 1 | |
|---|---|
| Attributes | Methods |
| selection | getSelectionStart() |
| | getSelectionStart(int) |
| | getSelectionStartLine() |
| | setSelectionStart(int) |
| | getSelectionEnd() |
| | getSelectionEnd(int) |
| | getSelectionEndLine() |
| | setSelectionEnd(int) |
| | getSelectionCount() |
| | setSelection(Selection[]) |
| | setSelection(Selection) |
| | addToSelection(Selection[]) |
| | addToSelection(Selection) |
| | getSelectionStartAndEnd(int, int) |
| | extendSelection(int , int) |
| | extendSelection(int, int, int, int) |
| **Class Extracted by the Developers - 2** | |
| Attributes | Methods |
| NO_SCROLL | getFoldPainterName() |
| mouseHandler | getFocusTraversalKeysEnabled() |
| scrollBarsInitialized | getFocusCycleRoot() |
| wrap | |
| **Class Extracted by the Developers - 3** | |
| Attributes | Methods |
| NORMAL_SCROLL | dispose() |
| ELECTRIC_SCROLL | getPainter() |
| view | getGutter() |
| lineSegment | getDisplayManager() |
| chunkCache | isCaretBlinkEnabled() |
| displayManager | setCaretBlinkEnabled(boolean) |
| bufferChanging | getElectricScroll() |
| maxHorizontalScrollWidth | setElectricScroll(int) |
| hardWrap | isQuickCopyEnabled() |
| tabSize | setQuickCopyEnabled(boolean) |
| charWidth | getBuffer() |
| maxLineLen | setBuffer(Buffer) |
| lastLinePartial | isEditable() |
| caretTimer | isDragInProgress() |
| structureTimer | setDragInProgress(boolean) |
| focusedComponent | isDragEnabled() |
| gutter | setDragEnabled(boolean) |

| | |
|---|---|
| painter | getFirstLine() |
| popup | setFirstLine(int) |
| popupEnabled | getFirstPhysicalLine() |
| listenerList | setFirstPhysicalLine(int) |
| caretEvent | setFirstPhysicalLine(int, int) |
| caretBlinks | getLastPhysicalLine() |
| blink | getVisibleLines() |
| physLastLine | getHorizontalOffset() |
| screenLastLine | setHorizontalOffset(int) |
| visibleLines | scrollUpLine() |
| electricScroll | scrollUpPage() |
| horizontalOffset | scrollDownLine() |
| quickCopy | scrollDownPage() |
| verticalBox | scrollToCaret(boolean) |
| vertical | scrollTo(int, boolean) |
| horizontal | scrollTo(int, int, boolean) |
| buffer | addScrollListener(ScrollListener) |
| caret | removeScrollListener(ScrollListener) |
| caretLine | getPhysicalLineOfScreenLine(int) |
| caretScreenLine | getScreenLineOfOffset(int) |
| structureMatchers | getScreenLineStartOffset(int) |
| match | getScreenLineEndOffset(int) |
| magicCaret | xyToOffset(int , int ) |
| multi | xyToOffset(int , int , boolean) |
| overwrite | xToScreenLineOffset(int, int, boolean) |
| rectangularSelectionMode | offsetToXY(int) |
| dndEnabled | offsetToXY(int, int, Point) |
| dndInProgress | invalidateScreenLineRange(int, int) |
| queuedCaretUpdate | invalidateLine(int) |
| queuedFireCaretEvent | invalidateLineRange(int, int) |
| | getBufferLength() |
| | getLineCount() |
| | getLineOfOffset(int) |
| | getLineStartOffset(int) |
| | getLineEndOffset(int) |
| | getLineLength(int) |
| | getText() |
| | getText(int, int) |
| | getText(int, int, Segment) |
| | getLineText(int) |
| | getLineText(int, Segment) |
| | setText(String) |
| | selectAll() |
| | selectLine() |

| | |
|---|---|
| | selectParagraph() |
| | selectWord() |
| | selectToMatchingBracket(int, boolean) |
| | selectToMatchingBracket() |
| | selectBlock() |
| | lineInStructureScope(int) |
| | selectNone() |
| | getSelectedText(Selection) |
| | getSelectedText(String) |
| | getSelectedText() |
| | setSelectedText(Selection, String) |
| | setSelectedText(String) |
| | setSelectedText(String, boolean) |
| | addStructureMatcher(StructureMatcher) |
| | removeStructureMatcher(StructureMatcher) |
| | getStructureMatch() |
| | blinkCaret() |
| | centerCaret() |
| | setCaretPosition(int) |
| | setCaretPosition(int, boolean) |
| | moveCaretPosition(int) |
| | moveCaretPosition(int, boolean) |
| | moveCaretPosition(int, int) |
| | getCaretPosition() |
| | getCaretLine() |
| | getMagicCaretPosition() |
| | setMagicCaretPosition(int) |
| | addCaretListener(CaretListener) |
| | removeCaretListener(CaretListener) |
| | goToNextBracket(boolean) |
| | goToNextCharacter(boolean) |
| | goToNextLine(boolean) |
| | goToNextPage(boolean) |
| | goToNextParagraph(boolean) |
| | goToNextWord(boolean) |
| | goToNextWord(boolean) |
| | goToPrevBracket(boolean) |
| | goToPrevCharacter(boolean) |
| | goToPrevLine(boolean) |
| | goToPrevPage(boolean) |
| | goToPrevParagraph(boolean) |
| | goToPrevWord(boolean) |
| | goToPrevWord(boolean, boolean) |
| | goToStartOfLine(boolean) |

| | goToEndOfLine(boolean) |
| --- | --- |
| | goToStartOfWhiteSpace(boolean) |
| | goToEndOfWhiteSpace(boolean) |
| | goToFirstVisibleLine(boolean) |
| | goToLastVisibleLine(boolean) |
| | goToMatchingBracket() |
| | isOverwriteEnabled() |
| | toggleOverwriteEnabled() |
| | backspace() |
| | backspaceWord() |
| | backspaceWord(boolean) |
| | delete() |
| | deleteToEndOfLine() |
| | deleteLine() |
| | deleteToStartOfLine() |
| | deleteWord() |
| | deleteWord(boolean) |
| | isMultipleSelectionEnabled() |
| | toggleMultipleSelectionEnabled() |
| | isRectangularSelectionEnabled() |
| | goToParentFold() |
| | goToNextFold(boolean) |
| | goToPrevFold(boolean) |
| | collapseFold() |
| | expandFold(boolean fully) |
| | selectFold() |
| | selectFold(int line) |
| | narrowToFold() |
| | narrowToSelection() |
| | lineComment() |
| | rangeComment() |
| | spacesToTabs() |
| | tabsToSpaces() |
| | toUpperCase() |
| | toLowerCase() |
| | removeTrailingWhiteSpace() |
| | insertEnterAndIndent() |
| | insertTabAndIndent() |
| | indentSelectedLines() |
| | shiftIndentLeft() |
| | shiftIndentRight() |
| | addLeftOfScrollBar(Component) |
| | removeLeftOfScrollBar(Component) |
| | addNotify() |

| | |
|---|---|
| | removeNotify() |
| | addTopComponent(Component) |
| | removeTopComponent(Component) |
| | getMarkPosition() |
| | getMarkLine() |
| | isCaretVisible() |
| | isStructureHighlightVisible() |
| | updateMaxHorizontalScrollWidth() |
| | recalculateVisibleLines() |
| | foldStructureChanged() |
| | _finishCaretUpdate() |
| | invalidateSelectedLines() |
| | fireCaretEvent() |
| | fireScrollEvent(boolean vertical) |
| | insertTab() |
| | doWordWrap(boolean spaceInserted) |
| | updateBracketHighlightWithDelay() |
| | updateStructureHighlight() |
| | showStructureStatusMessage(boolean) |
| | recalculateLastPhysicalLine() |
| | getRectParams(int, int) |
| | delete() |
| | tallCaretDelete(Selection.Rect, boolean) |
| | shiftTallCaretLeft(Selection.Rect) |
| | isRightClickPopupEnabled() |
| | setRightClickPopupEnabled(booleanEnabled) |
| | getRightClickPopup() |
| | setRightClickPopup(JPopupMenu) |
| | getSelectionAtOffset(int) |
| | removeFromSelection(Selection) |
| | resizeSelection(int, int, int, boolean) |
| | invertSelection() |
| | insideSelection(int, int) |
| | smartHome(boolean) |
| | smartEnd(boolean) |
| | goToBufferEnd(boolean) |
| | goToBufferStart(boolean) |
| | showGoToLineDialog() |
| | userInput(char ch) |
| | addExplicitFold() |
| | formatParagraph() |
| | doWordCount(View, String text) |
| | showWordCountDialog() |
| | select(int, int end) |

| | select(int, int end, boolean) |
|---|---|
| | handlePopupTrigger(MouseEvent) |

Table3 The new classes extracted by our approach

| Class Extracted our approach - 1 | |
|---|---|
| Attributes | Methods |
| scrollBarsInitialized | requestFocus() |
| tabSize | setFirstPhysicalLine(int) |
| wrap | repaint() |
| hardWrap | addTopComponent(Component) |
| blink | hasFocus() |
| structureMatchers | bufferChanging |
| popupEnabled | doWordCount(View, String) |
| verticalBox | isCaretVisible() |
| maxLineLen | removeStructureMatcher(StructureMatcher) |
| charWidth | addStructureMatcher(StructureMatcher) |
| returnValue | isRightClickPopupEnabled() |
| vertical | setRightClickPopupEnabled(boolean) |
| mouseHandler | removeLeftOfScrollBar(Component) |
| lineSegment | addLeftOfScrollBar(Component) |
| match | addFocusListener(FocusListener) |
| focusedComponent | setBorder(Border) |
| gutter | setLayout(LayoutManager) |
| horizontal | enableEvents(long) |
| view | getStructureMatch() |
| overwrite | getGutter() |
| rectangularSelectionMode | JEditTextArea(View) |
| painter | formatParagraph() |
| visibleLines | showStructureStatusMessage(boolean) |
| caretEvent | setMultipleSelectionEnabled(boolean) |
| listenerList | setRectangularSelectionEnabled(boolean) |
| | showWordCountDialog() |
| | toggleMultipleSelectionEnabled() |
| | toggleRectangularSelectionEnabled() |
| | toggleOverwriteEnabled() |
| | smartHome(boolean) |
| | smartEnd(boolean) |
| | showGoToLineDialog() |
| | getView() |
| | processKeyEvent(KeyEvent) |
| | showSelectLineRangeDialog() |
| | isRectangularSelectionEnabled() |
| | isOverwriteEnabled() |
| | getHorizontalOffset() |

| | |
|---|---|
| | setHorizontalOffset(int) |
| | horizontalOffset |
| | getPainter() |
| | getVisibleLines() |
| | centerCaret() |
| | xyToOffset(int, int, boolean) |
| | updateMaxHorizontalScrollWidth() |
| | removeNotify() |
| | maxHorizontalScrollWidth |
| | add(String, Component) |
| | fireScrollEvent(boolean) |
| | removeCaretListener(CaretListener) |
| | removeScrollListener(ScrollListener) |
| | addCaretListener(CaretListener) |
| | addScrollListener(ScrollListener) |
| | fireCaretEvent() |

**Class Extracted our approach - 2**

| Attributes | Methods |
|---|---|
| RIGHT | revalidate() |
| TOP | getTransferHandler() |
| physLastLine | getFocusCycleRoot() |
| LEFT | isShowing() |
| BOTTOM | getLastPhysicalLine() |
| CENTER | dispose() |
| dndInProgress | getFocusTraversalKeysEnabled() |
| caretBlinks | removeTopComponent(Component) |
| trace | remove(Component) |
| screenLastLine | getBorder() |
| chunkCache | setDragInProgress(boolean) |
| displayManager | isDragInProgress() |
| multi | isCaretBlinkEnabled() |
| caret | scrollUpLine() |
| caretLine | scrollDownLine() |
| selection | delete() |
| buffer | backspace() |
| | getSelectedText() |
| | setSelectedText(String) |
| | deleteWord() |
| | backspaceWord() |
| | goToNextWord(boolean) |
| | goToPrevWord(boolean) |
| | getWidth() |
| | getToolkit() |
| | extendSelection(int, int) |

| | moveCaretPosition(int) |
|---|---|
| | selectNone() |
| | recalculateLastPhysicalLine() |
| | foldStructureChanged() |
| | getPhysicalLineOfScreenLine(int) |
| | handlePopupTrigger(MouseEvent) |
| | setFirstLine(int) |
| | getFirstPhysicalLine() |
| | getFirstLine() |
| | setFirstPhysicalLine(int, int) |
| | isStructureHighlightVisible() |
| | offsetToXY(int, int, Point) |
| | addNotify() |
| | xToScreenLineOffset(int, int, boolean) |
| | getDisplayManager() |
| | finishCaretUpdate(boolean, boolean) |
| | updateScrollBars() |
| | propertiesChanged() |
| | invalidateScreenLineRange(int, int) |
| | scrollTo(int, int, boolean) |
| | getScreenLineEndOffset(int) |
| | getScreenLineStartOffset(int) |
| | getScreenLineOfOffset(int) |
| | invalidateLineRange(int, int) |
| | recalculateVisibleLines() |
| | setOverwriteEnabled(boolean) |
| | updateStructureHighlight() |
| | isMultipleSelectionEnabled() |
| | selectParagraph() |
| | selectLine() |
| | selectToMatchingBracket(int, boolean) |
| | selectWord() |
| | selectFold(int) |
| | blinkCaret() |
| | _finishCaretUpdate() |
| | lineInStructureScope(int) |
| | setCaretBlinkEnabled(boolean) |
| | selectFold() |
| | addToSelection(Selection[]) |
| | addToSelection(Selection) |
| | deleteParagraph() |
| | insertEnterAndIndent() |
| | joinLines() |
| | getCaretLine() |

| | narrowToFold() |
|---|---|
| | moveCaretPosition(int, int) |
| | goToLastVisibleLine(boolean) |
| | goToParentFold() |
| | getBuffer() |
| | setBuffer(org.gjt.sp.jedit.Buffer) |
| | doWordWrap(boolean) |
| | getMagicCaretPosition() |
| | selectToMatchingBracket() |
| | isSelectionRectangular() |
| | getCaretPosition() |
| | goToFirstVisibleLine(boolean) |
| | goToNextParagraph(boolean) |
| | lineComment() |
| | setSelectedText(String, boolean) |
| | goToPrevBracket(boolean) |
| | goToNextBracket(boolean) |
| | goToPrevMarker(boolean) |
| | goToMarker(char, boolean) |
| | goToNextMarker(boolean) |
| | goToBufferEnd(boolean) |
| | goToBufferStart(boolean) |
| | goToPrevParagraph(boolean) |
| | expandFold(boolean) |
| | goToNextPage(boolean) |
| | goToPrevPage(boolean) |
| | goToNextLine(boolean) |
| | goToPrevLine(boolean) |
| | goToNextFold(boolean) |
| | goToPrevFold(boolean) |
| | collapseFold() |
| | deleteLine() |
| | goToPrevWord(boolean, boolean) |
| | goToNextWord(boolean, boolean) |
| | goToPrevCharacter(boolean) |
| | goToEndOfLine(boolean) |
| | goToStartOfLine(boolean) |
| | scrollToCaret(boolean) |
| | goToMatchingBracket() |
| | deleteToEndOfLine() |
| | deleteToStartOfLine() |
| | insertTab() |
| | goToStartOfWhiteSpace(boolean) |
| | goToNextCharacter(boolean) |

| | selectBlock() |
|---|---|
| | getSelectionStartAndEnd(int, int, Selection) |
| | getMarkPosition() |
| | getRectParams(int, int) |
| | rangeComment() |
| | addMarker() |
| | userInput(char) |
| | extendSelection(int, int, int, int) |
| | addExplicitFold() |
| | _addToSelection(Selection) |
| | getMarkLine() |
| | getSelectedLines() |
| | removeFromSelection(Selection) |
| | removeFromSelection(int) |
| | invalidateSelectedLines() |
| | resizeSelection(int, int, int, boolean) |
| | getSelectionAtOffset(int) |
| | deleteWord(boolean) |
| | backspaceWord(boolean) |
| | insertTabAndIndent() |
| | getSelectionStart(int) |
| | getSelectionEnd(int) |
| | delete(boolean) |
| | getSelectionEnd() |
| | getSelectionStart() |
| | getSelectionEndLine() |
| | getSelectionStartLine() |
| | getSelectedText(String) |
| | invertSelection() |
| | narrowToSelection() |
| | setSelection(Selection[]) |
| | getSelectionCount() |
| | getSelection() |
| | setSelection(Selection) |
| | setCaretPosition(int) |
| | setCaretPosition(int, boolean) |
| | goToEndOfWhiteSpace(boolean) |
| | invalidateLine(int) |
| | xyToOffset(int, int) |
| | insideSelection(int, int) |
| | getLineOfOffset(int) |
| | getText(int, int) |
| | offsetToXY(int) |
| | scrollTo(int, boolean) |

| | indentSelectedLines() |
|---|---|
| | removeTrailingWhiteSpace() |
| | shiftIndentLeft() |
| | selectAll() |
| | swapMarkerAndCaret(char) |
| | getText(int, int, Segment) |
| | shiftIndentRight() |
| | isEditable() |
| | toLowerCase() |
| | toUpperCase() |
| | spacesToTabs() |
| | tabsToSpaces() |
| | getText() |
| | setText(String) |
| | getSelectedText(Selection) |
| | setSelectedText(Selection, String) |
| | getBufferLength() |
| | getLineText(int, Segment) |
| | getLineCount() |
| | getLineEndOffset(int) |
| | getLineStartOffset(int) |
| | getLineLength(int) |
| | tallCaretDelete(Selection$Rect, boolean) |
| | shiftTallCaretLeft(Selection$Rect) |
| | getLineText(int) |
| **Class Extracted our approach - 3** | |
| Attributes | Methods |
| magicCaret | setDragAndDropCallback(Method) |
| dndCallback | startDragAndDrop(InputEvent, boolean) |
| popup | getDragAndDropCallback() |
| electricScroll | setTransferHandler(TransferHandler) |
| quickCopy | addMouseWheelListener(MouseWheelListener) |
| dndEnabled | getDropTarget() |
| lastLinePartial | setRightClickPopup(JPopupMenu) |
| caretScreenLine | getRightClickPopup() |
| queuedFireCaretEvent | getElectricScroll() |
| queuedScrollToElectric | setElectricScroll(int) |
| queuedCaretUpdate | setQuickCopyEnabled(boolean) |
| caretTimer | isQuickCopyEnabled() |
| NO_SCROLL | isDragEnabled() |
| NORMAL_SCROLL | setDragEnabled(boolean) |
| ELECTRIC_SCROLL | select(int, int, boolean) |
| structureTimer | select(int, int) |
| | setSelectionEnd(int) |

| | setSelectionStart(int) |
| | scrollDownPage() |
| | scrollUpPage() |
| | static {} |
| | moveCaretPosition(int, boolean) |
| | updateBracketHighlightWithDelay() |
| | setMagicCaretPosition(int) |

Table 4 The new classes extracted by Bavota's approach[14]

| Class Extracted Bavota's approach - 1 | |
|---|---|
| Attributes | Methods |
| visibleLines | addTopComponent(Component) |
| match | backspace() |
| multi | backspaceWord() |
| overwrite | delete() |
| painter | deleteWord() |
| verticalBox | dispose() |
| horizontalOffset | getFocusCycleRoot() |
| physLastLine | getFocusTraversalKeysEnabled() |
| dndInProgress | goToNextWord(boolean) |
| quickCopy | getStructureMatch() |
| dndEnabled | isMultipleSelectionEnabled() |
| popup | isOverwriteEnabled() |
| popupEnabled | getPainter() |
| rectangularSelectionMode | getLastPhysicalLine() |
| selection | isRectangularSelectionEnabled() |
| view | removeTopComponent(Component) |
| structureMatchers | select(int, int) |
| | isDragInProgress() |
| | setDragInProgress(boolean) |
| | setFirstPhysicalLine(int) |
| | getHorizontalOffset() |
| | setHorizontalOffset(int) |
| | isQuickCopyEnabled() |
| | setQuickCopyEnabled(boolean) |
| | isDragEnabled() |
| | setDragEnabled(boolean) |
| | getElectricScroll() |
| | setElectricScroll(int) |
| | getRightClickPopup() |
| | setRightClickPopup(JPopupMenu) |
| | isRightClickPopupEnabled() |
| | setRightClickPopupEnabled(boolean) |
| | getSelectionCount() |

| | doWordCount(View, String) |
|---|---|
| | getSelectedText() |
| | setSelectedText(String) |
| | addStructureMatcher(StructureMatcher) |
| | removeStructureMatcher(StructureMatcher) |
| | addLeftOfScrollBar(Component) |
| | removeLeftOfScrollBar(Component) |
| | toggleOverwriteEnabled() |
| | showGoToLineDialog() |
| | smartEnd(boolean) |
| | smartHome(boolean) |
| | centerCaret() |
| | getVisibleLines() |

| Class Extracted Bavota's approach - 2 | |
|---|---|
| Attributes | Methods |
| buffer | removeNotify() |
| gutter | getGutter() |
| charWidth | focusedComponent |
| maxLineLen | fireCaretEvent() |
| bufferChanging | removeCaretListener(javax.swing.event.CaretListener) |
| magicCaret | fireScrollEvent(boolean) |
| horizontal | addCaretListener(javax.swing.event.CaretListener) |
| mouseHandler | addScrollListener(ScrollListener) |
| caretEvent | removeScrollListener(ScrollListener) |
| caretScreenLine | updateBracketHighlightWithDelay() |
| maxHorizontalScrollWidth | scrollUpLine() |
| blink | scrollDownLine() |
| caretTimer | isCaretVisible() |
| ELECTRIC_SCROLL | isCaretBlinkEnabled() |
| NORMAL_SCROLL | setSelectionEnd(int) |
| NO_SCROLL | setSelectionStart(int) |
| structureTimer | scrollDownPage() |
| queuedCaretUpdate | scrollUpPage() |
| queuedFireCaretEvent | setMagicCaretPosition(int) |
| vertical | displayManager |
| hardWrap | extendSelection(int, int) |
| tabSize | selectNone() |
| chunkCache | moveCaretPosition(int) |
| wrap | updateMaxHorizontalScrollWidth() |
| caret | handlePopupTrigger(java.awt.event.MouseEvent) |
| listenerList | recalculateLastPhysicalLine() |
| caretBlinks | setFirstLine(int) |
| screenLastLine | getFirstPhysicalLine() |
| electricScroll | getFirstLine() |

| | |
|---|---|
| lastLinePartial | foldStructureChanged() |
| lineSegment | getPhysicalLineOfScreenLine(int) |
| scrollBarsInitialized | setCaretPosition(int) |
| caretLine | setSelection(Selection) |
| | addToSelection(Selection) |
| | isStructureHighlightVisible() |
| | getDisplayManager() |
| | toggleMultipleSelectionEnabled() |
| | selectLine() |
| | selectParagraph() |
| | getSelectionAtOffset(int) |
| | narrowToSelection() |
| | blinkCaret() |
| | resizeSelection(int, int, int, boolean) |
| | removeFromSelection(int) |
| | lineInStructureScope(int) |
| | selectFold() |
| | invalidateSelectedLines() |
| | selectToMatchingBracket() |
| | getSelectionEndLine() |
| | getSelectionStartLine() |
| | getSelectionEnd() |
| | getSelectionStart() |
| | updateStructureHighlight() |
| | getCaretLine() |
| | getMarkPosition() |
| | getCaretPosition() |
| | getMarkLine() |
| | goToPrevBracket(boolean) |
| | goToLastVisibleLine(boolean) |
| | goToNextParagraph(boolean) |
| | goToFirstVisibleLine(boolean) |
| | getMagicCaretPosition() |
| | goToEndOfLine(boolean) |
| | goToEndOfWhiteSpace(boolean) |
| | goToStartOfLine(boolean) |
| | goToPrevParagraph(boolean) |
| | goToPrevCharacter(boolean) |
| | goToNextPage(boolean) |
| | goToPrevPage(boolean) |
| | expandFold(boolean) |
| | _finishCaretUpdate() |
| | getSelectionStartAndEnd(int, int, Selection) |
| | addExplicitFold() |

| | getRectParams(int, int) |
|---|---|
| | rangeComment() |
| | formatParagraph() |
| | recalculateVisibleLines() |
| | goToNextCharacter(boolean) |
| | setBuffer(Buffer) |
| | invalidateScreenLineRange(int, int) |
| | invalidateLine(int) |
| | doWordWrap(boolean) |
| | goToStartOfWhiteSpace(boolean) |
| | collapseFold() |
| | goToPrevLine(boolean) |
| | goToNextLine(boolean) |
| | goToPrevFold(boolean) |
| | goToNextFold(boolean) |
| | deleteLine() |
| | selectBlock() |
| | addNotify() |
| | goToBufferStart(boolean) |
| | goToBufferEnd(boolean) |
| | setCaretBlinkEnabled(boolean) |
| | goToParentFold() |
| | insertTabAndIndent() |
| | deleteToStartOfLine() |
| | deleteToEndOfLine() |
| | goToNextBracket(boolean) |
| | narrowToFold() |
| | goToMatchingBracket() |
| | insertTab() |
| | invalidateLineRange(int, int) |
| | scrollToCaret(boolean) |
| | showStructureStatusMessage(boolean) |
| | getScreenLineOfOffset(int) |
| | getScreenLineStartOffset(int) |
| | getScreenLineEndOffset(int) |
| | lineComment() |
| | insertEnterAndIndent() |
| | invertSelection() |
| | selectWord() |
| | showWordCountDialog() |
| | getBuffer() |
| | getLineOfOffset(int) |
| | getBufferLength() |
| | getLineCount() |

| | getLineEndOffset(int) |
|---|---|
| | getLineStartOffset(int) |
| | getLineLength(int) |
| | scrollTo(int, boolean) |
| | shiftTallCaretLeft(Selection$Rect) |
| | tallCaretDelete(Selection$Rect, boolean) |
| | selectAll() |
| | offsetToXY(int) |
| | shiftIndentLeft() |
| | getLineText(int) |
| | shiftIndentRight() |
| | isEditable() |
| | removeTrailingWhiteSpace() |
| | insideSelection(int, int) |
| | indentSelectedLines() |
| | getText() |
| | setText(String) |
| | spacesToTabs() |
| | tabsToSpaces() |
| | toLowerCase() |
| | toUpperCase() |
| | userInput(char) |
| | xToScreenLineOffset(int, int, boolean) |
| | xyToOffset(int, int) |

Table 5 The new classes extracted by Fokaefs' approach

| Class Extracted Fokaefs' approach - 1 | |
|---|---|
| Attributes | Methods |
| caretBlinks | scrollUpLine() |
| screenLastLine | scrollDownLine() |
| electricScroll | isCaretVisible() |
| lastLinePartial | isCaretBlinkEnabled() |
| lineSegment | setSelectionEnd(int) |
| chunkCache | setSelectionStart(int) |
| displayManager | scrollBarsInitialized |
| caret | scrollDownPage() |
| buffer | scrollUpPage() |
| caretLine | setMagicCaretPosition(int) |
| | extendSelection(int, int) |
| | selectNone() |
| | moveCaretPosition(int) |
| | updateMaxHorizontalScrollWidth() |
| | handlePopupTrigger(java.awt.event.MouseEvent) |
| | recalculateLastPhysicalLine() |

| | setFirstLine(int) |
| --- | --- |
| | getFirstPhysicalLine() |
| | getFirstLine() |
| | foldStructureChanged() |
| | getPhysicalLineOfScreenLine(int) |
| | setCaretPosition(int) |
| | setSelection(Selection) |
| | addToSelection(Selection) |
| | isStructureHighlightVisible() |
| | getDisplayManager() |
| | toggleMultipleSelectionEnabled() |
| | selectLine() |
| | selectParagraph() |
| | getSelectionAtOffset(int) |
| | narrowToSelection() |
| | blinkCaret() |
| | resizeSelection(int, int, int, boolean) |
| | removeFromSelection(int) |
| | lineInStructureScope(int) |
| | selectFold() |
| | invalidateSelectedLines() |
| | selectToMatchingBracket() |
| | getSelectionEndLine() |
| | getSelectionStartLine() |
| | getSelectionEnd() |
| | getSelectionStart() |
| | updateStructureHighlight() |
| | getCaretLine() |
| | getMarkPosition() |
| | getCaretPosition() |
| | getMarkLine() |
| | goToPrevBracket(boolean) |
| | goToLastVisibleLine(boolean) |
| | goToNextParagraph(boolean) |
| | goToFirstVisibleLine(boolean) |
| | getMagicCaretPosition() |
| | goToEndOfLine(boolean) |
| | goToEndOfWhiteSpace(boolean) |
| | goToStartOfLine(boolean) |
| | goToPrevParagraph(boolean) |
| | goToPrevCharacter(boolean) |
| | goToNextPage(boolean) |
| | goToPrevPage(boolean) |
| | expandFold(boolean) |

| | | _finishCaretUpdate() |
|---|---|---|
| | | getSelectionStartAndEnd(int, int, Selection) |
| | | addExplicitFold() |
| | | getRectParams(int, int) |
| | | rangeComment() |
| | | formatParagraph() |
| | | recalculateVisibleLines() |
| | | goToNextCharacter(boolean) |
| | | setBuffer(Buffer) |
| | | invalidateScreenLineRange(int, int) |
| | | invalidateLine(int) |
| | | doWordWrap(boolean) |
| | | goToStartOfWhiteSpace(boolean) |
| | | collapseFold() |
| | | goToPrevLine(boolean) |
| | | goToNextLine(boolean) |
| | | goToPrevFold(boolean) |
| | | goToNextFold(boolean) |
| | | deleteLine() |
| | | selectBlock() |
| | | addNotify() |
| | | goToBufferStart(boolean) |
| | | goToBufferEnd(boolean) |
| | | setCaretBlinkEnabled(boolean) |
| | | goToParentFold() |
| | | insertTabAndIndent() |
| | | deleteToStartOfLine() |
| | | deleteToEndOfLine() |
| | | goToNextBracket(boolean) |
| | | narrowToFold() |
| | | goToMatchingBracket() |
| | | insertTab() |
| | | invalidateLineRange(int, int) |
| | | scrollToCaret(boolean) |
| | | showStructureStatusMessage(boolean) |
| | | getScreenLineOfOffset(int) |
| | | getScreenLineStartOffset(int) |
| | | getScreenLineEndOffset(int) |
| | | lineComment() |
| | | insertEnterAndIndent() |
| | | invertSelection() |
| | | selectWord() |
| | | showWordCountDialog() |
| | | getBuffer() |

| | getLineOfOffset(int) |
|---|---|
| | getBufferLength() |
| | getLineCount() |
| | getLineEndOffset(int) |
| | getLineStartOffset(int) |
| | getLineLength(int) |
| | scrollTo(int, boolean) |
| | shiftTallCaretLeft(Selection$Rect) |
| | tallCaretDelete(Selection$Rect, boolean) |
| | selectAll() |
| | offsetToXY(int) |
| | shiftIndentLeft() |
| | getLineText(int) |
| | shiftIndentRight() |
| | isEditable() |
| | removeTrailingWhiteSpace() |
| | insideSelection(int, int) |
| | indentSelectedLines() |
| | getText() |
| | setText(java.lang.String) |
| | xToScreenLineOffset(int, int, boolean) |
| | xyToOffset(int, int) |

| Class Extracted Fokaefs' approach - 2 | |
|---|---|
| **Attributes** | **Methods** |
| vertical | maxHorizontalScrollWidth |
| hardWrap | removeNotify() |
| tabSize | getGutter() |
| wrap | fireCaretEvent() |
| gutter | removeCaretListener(CaretListener) |
| charWidth | fireScrollEvent(boolean) |
| maxLineLen | addCaretListener(CaretListener) |
| bufferChanging | addScrollListener(ScrollListener) |
| magicCaret | removeScrollListener(ScrollListener) |
| horizontal | updateBracketHighlightWithDelay() |
| focusedComponent | spacesToTabs() |
| mouseHandler | tabsToSpaces() |
| caretEvent | toLowerCase() |
| caretScreenLine | toUpperCase() |
| listenerList | userInput(char) |
| blink | |
| caretTimer | |
| ELECTRIC_SCROLL | |
| NORMAL_SCROLL | |
| NO_SCROLL | |

| structureTimer | |
| queuedCaretUpdate | |
| queuedFireCaretEvent | |

| Class Extracted our approach - 3 | |
|---|---|
| Attributes | Methods |
| visibleLines | addTopComponent(Component) |
| match | backspace() |
| multi | backspaceWord() |
| overwrite | delete() |
| painter | deleteWord() |
| rectangularSelectionMode | dispose() |
| physLastLine | getFocusCycleRoot() |
| dndInProgress | getFocusTraversalKeysEnabled() |
| horizontalOffset | goToNextWord(boolean) |
| quickCopy | getStructureMatch() |
| dndEnabled | isMultipleSelectionEnabled() |
| popup | isOverwriteEnabled() |
| selection | getPainter() |
| structureMatchers | getLastPhysicalLine() |
| view | isRectangularSelectionEnabled() |
| verticalBox | removeTopComponent(Component) |
| popupEnabled | select(int, int) |
| | isDragInProgress() |
| | setDragInProgress(boolean) |
| | setFirstPhysicalLine(int) |
| | getHorizontalOffset() |
| | setHorizontalOffset(int) |
| | isQuickCopyEnabled() |
| | setQuickCopyEnabled(boolean) |
| | isDragEnabled() |
| | setDragEnabled(boolean) |
| | getElectricScroll() |
| | setElectricScroll(int) |
| | getRightClickPopup() |
| | setRightClickPopup(JPopupMenu) |
| | isRightClickPopupEnabled() |
| | setRightClickPopupEnabled(boolean) |
| | getSelectionCount() |
| | doWordCount(View, String) |
| | getSelectedText() |
| | setSelectedText(String) |
| | addStructureMatcher(StructureMatcher) |
| | removeStructureMatcher(StructureMatcher) |
| | addLeftOfScrollBar(Component) |

| | |
|---|---|
| | removeLeftOfScrollBar(Component) |
| | toggleOverwriteEnabled() |
| | showGoToLineDialog() |
| | smartEnd(boolean) |
| | smartHome(boolean) |
| | centerCaret() |
| | getVisibleLines() |