

JavaFX Documentation Project

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Chapter 1. Introduction

The JavaFX Documentation Project aims to pull together useful information for JavaFX developers from all over the web. The project is [open source](#) and encourages community participation to ensure that the documentation is as highly polished and useful as possible.

1.1. Contributors

This project would not be possible without the contributors who work hard on the content contained within this documentation. Whenever possible contributors are given attribution within the document when they write a section, but it is also important to gather all names here, at the top of the document, to give the recognition that these contributors deserve.

1.2. Contributing

Contributing to this project is easy - fork the [GitHub](#) repo, edit the relevant files, and create a pull request! Once merged, your content will form a part of the documentation and you'll have the unending appreciation of the entire community!

The JavaFX Documentation Project uses AsciiDoc as the syntax of choice for writing the documentation. The [AsciiDoc Syntax Quick Reference](#) guide is a great resource for those learning how to write AsciiDoc.

Authors are welcome to include a byline beneath the sections that they have authored. To ensure consistency, the recommended format for the byline is the following:

Contributed by <name> - <website>

Chapter 2. Scenegraph

Placeholder whilst things get built...

Chapter 3. UI Controls

3.1. ListView

3.1.1. ListView Filtering in JavaFX

(Contributed by Carl Walker, October 1, 2016)

This article demonstrates how to filter a ListView in a JavaFX Application. Two lists are managed by the Application. One list contains all of the items in the data model. The second list contains the items currently being viewed. A scrap of comparison logic stored as a filter mediates between the two.

Binding is used heavily to keep the data structures in sync with what the user has selected.

This screenshot shows the Application which contains a top row of ToggleButtons which set the filter and a ListView containing the objects.



Figure 1. Screenshot of ListView Filtering App

The complete code — a single .java file — is listed at the end of the article.

3.2. Data Structures

The program begins with a domain model `Player` and an array of `Player` objects.

```
static class Player {  
  
    private final String team;  
    private final String playerName;  
    public Player(String team, String playerName) {  
        this.team = team;  
        this.playerName = playerName;  
    }  
    public String getTeam() {  
        return team;  
    }  
    public String getPlayerName() {  
        return playerName;  
    }  
    @Override  
    public String toString() { return playerName + " (" + team + ")"; }  
}
```

The `Player` class contains a pair of fields, `team` and `playerName`. A `toString()` is provided so that when the object is added to the `ListView` (presented later), a custom `ListCell` class is not needed.

The test data for this example is a list of American baseball players.

```
Player[] players = {new Player("BOS", "David Ortiz"),  
                    new Player("BOS", "Jackie Bradley Jr."),  
                    new Player("BOS", "Xander Bogaerts"),  
                    new Player("BOS", "Mookie Betts"),  
                    new Player("HOU", "Jose Altuve"),  
                    new Player("HOU", "Will Harris"),  
                    new Player("WSH", "Max Scherzer"),  
                    new Player("WSH", "Bryce Harper"),  
                    new Player("WSH", "Daniel Murphy"),  
                    new Player("WSH", "Wilson Ramos") };
```

3.3. Model

As mentioned at the start of the article, the `ListView` filtering is centered around the management of two lists. All the objects are stored in a wrapped `ObservableList` `playersProperty` and the objects that are currently viewable are stored in a wrapped `FilteredList`, `viewablePlayersProperty`. `viewablePlayersProperty` is built off of `playersProperty` so updates made to players that meet the `FilteredList` criteria will also be made to `viewablePlayers`.

```
ReadOnlyObjectProperty<ObservableList<Player>> playersProperty =
    new SimpleObjectProperty<>(FXCollections.observableArrayList());

ReadOnlyObjectProperty<FilteredList<Player>> viewablePlayersProperty =
    new SimpleObjectProperty<FilteredList<Player>>(
        new FilteredList<>(playersProperty.get()
        ));
```

`filterProperty()` is a convenience to allow callers to bind to the underlying Predicate.

```
ObjectProperty<Predicate<? super Player>> filterProperty =
    viewablePlayersProperty.get().predicateProperty();
```

The UI root is a VBox which contains an HBox of ToggleButtons and a ListView.

```
VBox vbox = new VBox();
vbox.setPadding( new Insets(10));
vbox.setSpacing(4);

HBox hbox = new HBox();
hbox.setSpacing( 2 );

ToggleGroup filterTG = new ToggleGroup();
```

3.4. Filtering Action

A handler is attached the ToggleButtons which will modify `filterProperty`. Each `ToggleButton` is supplied a Predicate in the `userData` field. `toggleHandler` uses this supplied Predicate when setting the filter property. This code sets the special case "Show All" `ToggleButton`.

```
@SuppressWarnings("unchecked")
EventHandler<ActionEvent> toggleHandler = (event) -> {
    ToggleButton tb = (ToggleButton)event.getSource();
    Predicate<Player> filter = (Predicate<Player>)tb.getUserData();
    filterProperty.set( filter );
};

ToggleButton tbShowAll = new ToggleButton("Show All");
tbShowAll.setSelected(true);
tbShowAll.setToggleGroup( filterTG );
tbShowAll.setOnAction(toggleHandler);
tbShowAll.setUserData( (Predicate<Player>) (Player p) -> true);
```

The `ToggleButtons` that filter a specific team are created at runtime based on the `Players` array. This Stream does the following.

1. Distill the list of Players down to a distinct list of team Strings
2. Create a ToggleButton for each team String
3. Set a Predicate for each ToggleButton to be used as a filter
4. Collect the ToggleButtons for addition into the HBox container

```
List<ToggleButton> tbs = Arrays.asList( players)
    .stream()
    .map( (p) -> p.getTeam() )
    .distinct()
    .map( (team) -> {
        ToggleButton tb = new ToggleButton( team );
        tb.setToggleGroup( filterTG );
        tb.setOnAction( toggleHandler );
        tb.setUserData( (Predicate<Player>) (Player p) -> team.equals(p.getTeam())
    );
        return tb;
    })
    .collect(Collectors.toList());

hbox.getChildren().add( tbShowAll );
hbox.getChildren().addAll( tbs );
```

3.5. ListView

The next step creates the ListView and binds the ListView to the viewablePlayersProperty. This enables the ListView to receive updates based on the changing filter.

```
ListView<Player> lv = new ListView<>();
lv.itemsProperty().bind( viewablePlayersProperty );
```

The remainder of the program creates a Scene and shows the Stage. onShown loads the data set into the playersProperty and the viewablePlayersProperty lists. Although both lists are in sync in this particular version of the program, if the stock filter is every different than "no filter", this code would not need to be modified.

```
vbox.getChildren().addAll( hbox, lv );

Scene scene = new Scene(vbox);

primaryStage.setScene( scene );
primaryStage.setOnShown((evt) -> {
    playersProperty.get().addAll( players );
});

primaryStage.show();
```


This article used binding to tie a list of viewable Player objects to a ListView. The viewable Players were updated when a ToggleButton is selected. The selection applied a filter to a full set of Players which was maintained separately as a FilteredList (thanks @kleopatra_jx). Binding was used to keep the UI in sync and to allow for a separation of concerns in the design.

3.6. Further Reading

To see how such a design would implement basic add and remove functionality, visit the following page https://courses.bekwam.net/public_tutorials/bkcourse_filterlistapp.php.

3.7. Complete Code

The code can be tested in a single .java file.

```
public class FilterListApp extends Application {

    @Override
    public void start(Stage primaryStage) throws Exception {

        //
        // Test data
        //
        Player[] players = {new Player("BOS", "David Ortiz"),
                             new Player("BOS", "Jackie Bradley Jr."),
                             new Player("BOS", "Xander Bogarts"),
                             new Player("BOS", "Mookie Betts"),
                             new Player("HOU", "Jose Altuve"),
                             new Player("HOU", "Will Harris"),
                             new Player("WSH", "Max Scherzer"),
                             new Player("WSH", "Bryce Harper"),
                             new Player("WSH", "Daniel Murphy"),
                             new Player("WSH", "Wilson Ramos") };

        //
        // Set up the model which is two lists of Players and a filter criteria
        //
        ReadOnlyObjectProperty<ObservableList<Player>> playersProperty =
            new SimpleObjectProperty<>(FXCollections.observableArrayList());

        ReadOnlyObjectProperty<FilteredList<Player>> viewablePlayersProperty =
            new SimpleObjectProperty<FilteredList<Player>>(>
                new FilteredList<>(playersProperty.get()
                ));

        ObjectProperty<Predicate<? super Player>> filterProperty =
            viewablePlayersProperty.get().predicateProperty();

        //
    }
}
```

```

// Build the UI
//
VBox vbox = new VBox();
vbox.setPadding( new Insets(10));
vbox.setSpacing(4);

HBox hbox = new HBox();
hbox.setSpacing( 2 );

ToggleGroup filterTG = new ToggleGroup();

//
// The toggleHandler action wills set the filter based on the TB selected
//
@SuppressWarnings("unchecked")
EventHandler<ActionEvent> toggleHandler = (event) -> {
    ToggleButton tb = (ToggleButton)event.getSource();
    Predicate<Player> filter = (Predicate<Player>)tb.getUserData();
    filterProperty.set( filter );
};

ToggleButton tbShowAll = new ToggleButton("Show All");
tbShowAll.setSelected(true);
tbShowAll.setToggleGroup( filterTG );
tbShowAll.setOnAction(toggleHandler);
tbShowAll.setUserData( (Predicate<Player>) (Player p) -> true);

//
// Create a distinct list of teams from the Player objects, then create
// ToggleButtons
//
List<ToggleButton> tbs = Arrays.asList( players)
    .stream()
    .map( (p) -> p.getTeam() )
    .distinct()
    .map( (team) -> {
        ToggleButton tb = new ToggleButton( team );
        tb.setToggleGroup( filterTG );
        tb.setOnAction( toggleHandler );
        tb.setUserData( (Predicate<Player>) (Player p) ->
team.equals(p.getTeam()) );
        return tb;
    })
    .collect(Collectors.toList());

hbox.getChildren().add( tbShowAll );
hbox.getChildren().addAll( tbs );

//
// Create a ListView bound to the viewablePlayers property
//

```

```

        ListView<Player> lv = new ListView<>();
        lv.itemsProperty().bind( viewablePlayersProperty );

        vbox.getChildren().addAll( hbox, lv );

        Scene scene = new Scene(vbox);

        primaryStage.setScene( scene );
        primaryStage.setOnShown((evt) -> {
            playersProperty.get().addAll( players );
        });

        primaryStage.show();
    }

    public static void main(String args[]) {
        launch(args);
    }

    static class Player {

        private final String team;
        private final String playerName;
        public Player(String team, String playerName) {
            this.team = team;
            this.playerName = playerName;
        }
        public String getTeam() {
            return team;
        }
        public String getPlayerName() {
            return playerName;
        }
        @Override
        public String toString() { return playerName + " (" + team + ")"; }
    }
}

```

Chapter 4. CSS

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Chapter 5. Performance

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Chapter 6. Application Structure

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Chapter 7. Best Practices

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1. Styleable Properties

7.1. 1. Styleable Properties

Author: Gerrit Grunwald

```
/* Member variables for StyleablePropertyFactory
 * and StyleableProperty
 */
private static final StyleablePropertyFactory<MY_CTRL> FACTORY =
    new StyleablePropertyFactory<>(Control.getClassCssMetaData());

private static final CssMetaData<MY_CTRL, Color> COLOR =
    FACTORY.createColorCssMetaData("-color", s -> s.color, Color.RED, false);
private final StyleableProperty<Color> color = new
SimpleStyleableObjectProperty<>(COLOR, this, "color");

// Getter, Setter and Property method
public Color getColor() {
    return this.color.getValue();
}

public void setColor(final Color color) {
    this.color.setValue(COLOR);
}

public ObjectProperty<Color> colorProperty() {
    return (ObjectProperty<Color>) this.color;
}

// Return CSS Metadata
public static List<CssMetaData<? extends Styleable, ?>> getClassCssMetaData() {
    return FACTORY.getCssMetaData();
}

@Override public List<CssMetaData<? extends Styleable, ?>> getControlCssMetaData() {
    return getClassCssMetaData();
}
```

Chapter 8. Contributing

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Chapter 9. License



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