TA Programming of Interactive Systems

https://www.lri.fr/~cfleury/teaching/ISI2014/

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The presentation is based on last year's presentation by David Bonnet and Cédric Fleury.

Model-View-Controller (MVC) Design Pattern

Exercise 2

MVC

Based on the **divide and conquer** principle:

Model

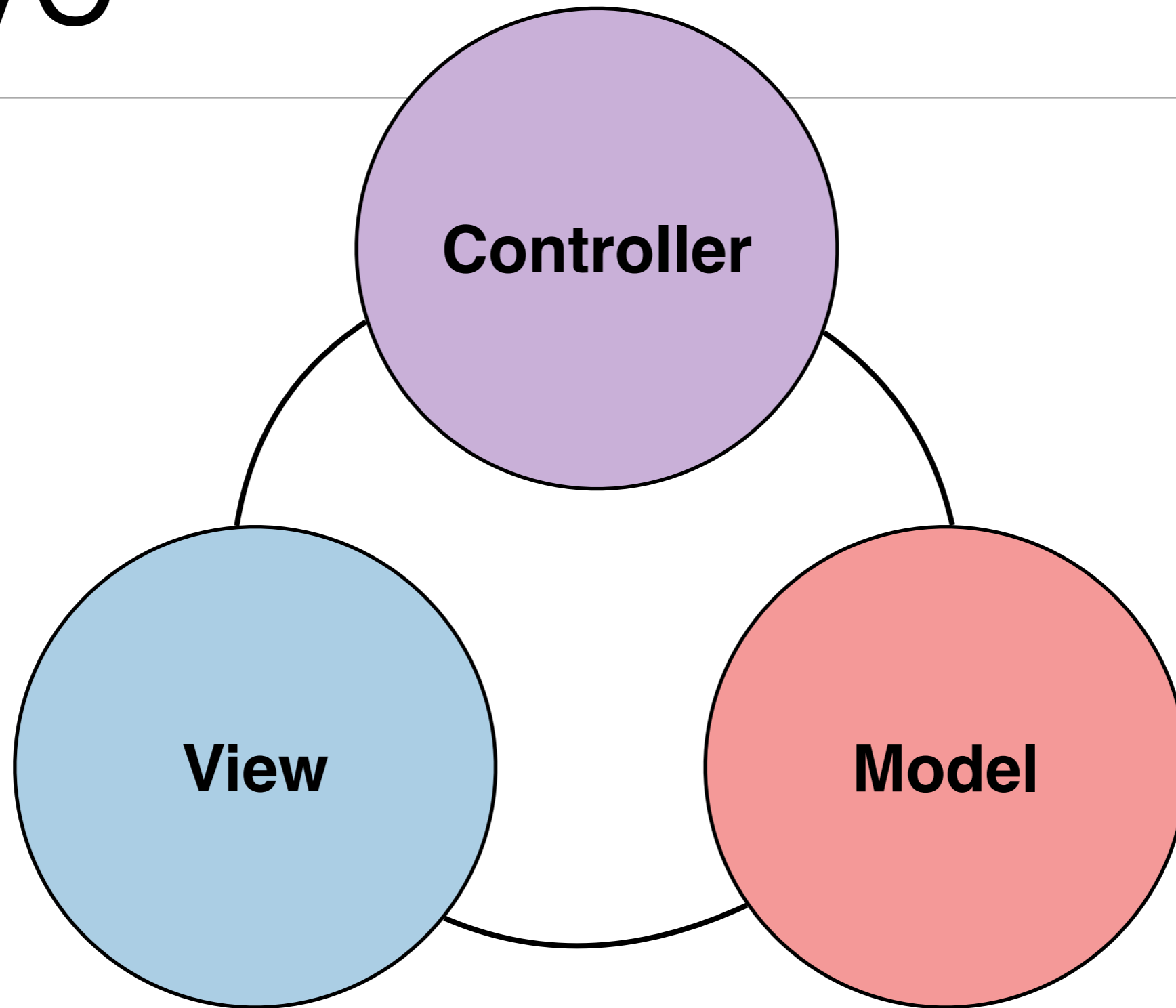Holds the abstract data (e.g. a number) and methods to handle it.

View

Defines the visual representation of a data (e.g. a slider to represent a number).
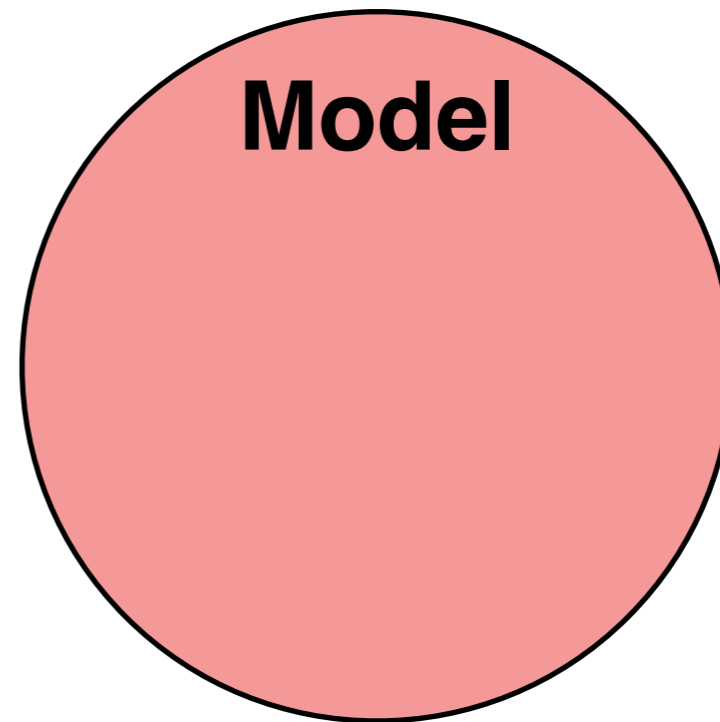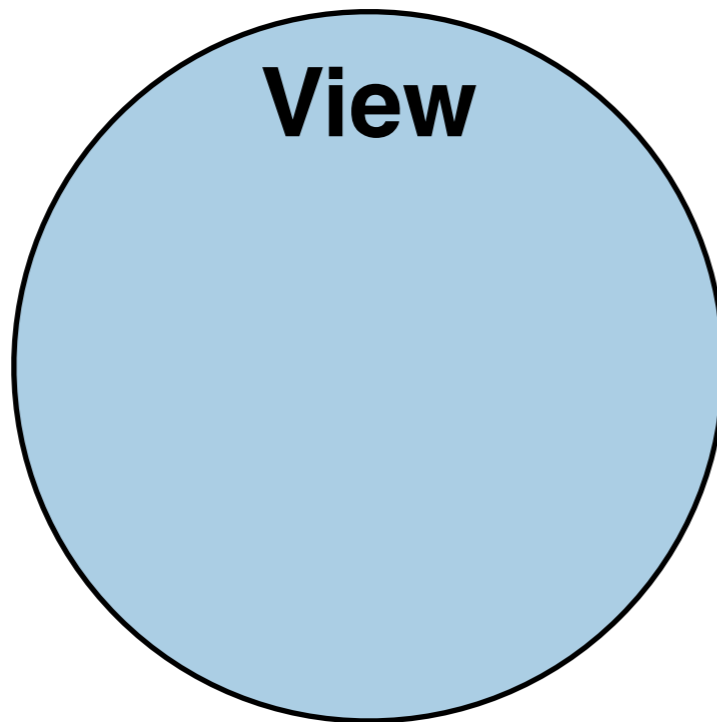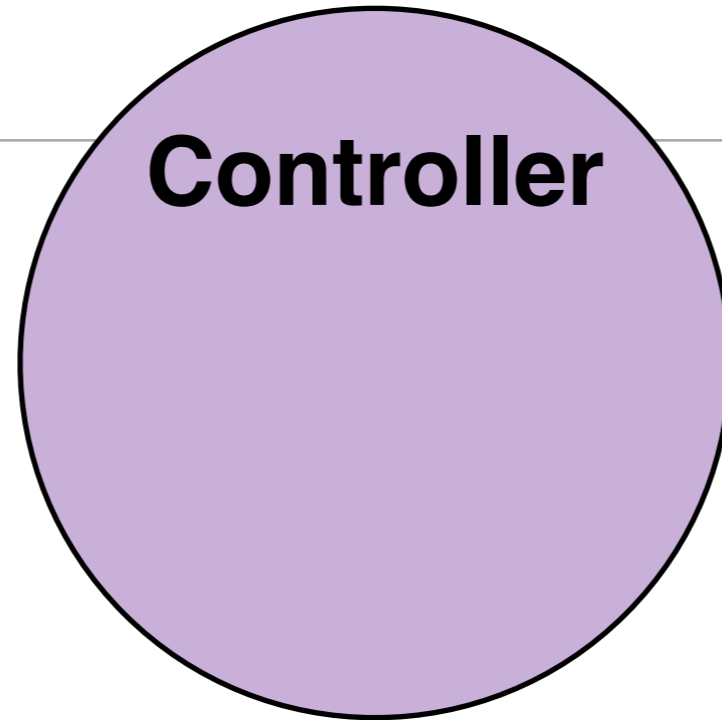
Controller

Manages the user input and sets the application behavior (e.g. adds a listener to the slider that updates the number).

MVC

Example

Temperature
Converter

Controller

View

Model

Example

Temperature
Converter

Controller

View

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()

5

Example

Temperature
Converter

Controller

View

TemperatureView

- JTextField celsiusValue
- JTextField fahrenheitValue
- JButton closeButton
- JButton resetButton

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()

5

Example

Temperature
Converter

Controller

TemperatureController

- Listeners on JTextFields
- Listener on closeButton
- Listener on resetButton

View

TemperatureView

- JTextField celsiusValue
- JTextField fahrenheitValue
- JButton closeButton
- JButton resetButton

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()

Example

Temperature
Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
• bind(View view)

View

Temperature converter

Celsius

37

Fahrenheit

98.6

Reset   Close

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
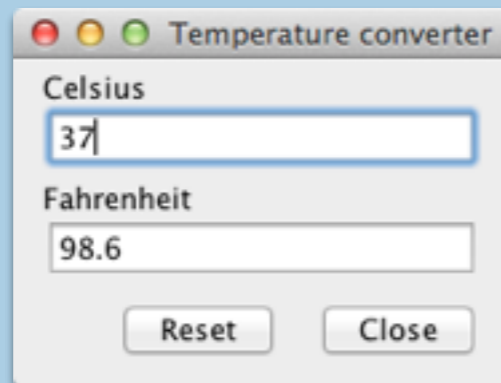• getCelsiusValue()
• getFahrenheitValue()

Example

Temperature
Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
• bind(View view)

View

🔴 🟡 🟢 Temperature converter

Celsius
37

Fahrenheit
98.6

Reset   Close

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()

User

6

Example

Temperature Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
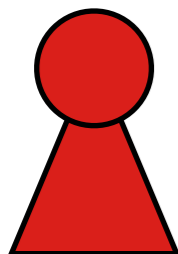• bind(View view)

View

Temperature converter

Celsius
37

Fahrenheit
98.6

Reset   Close

User

input

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
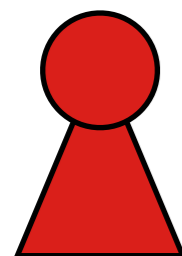• getCelsiusValue()
• getFahrenheitValue()

Example

Temperature
Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
• bind(View view)

notify

View

🔴 🟡 🟢 Temperature converter

Celsius

37

Fahrenheit

98.6

Reset   Close

input

User

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()
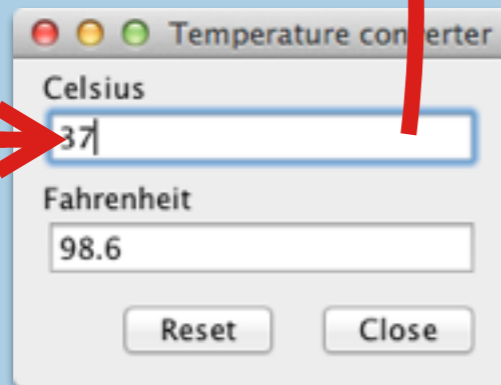
Example

Temperature
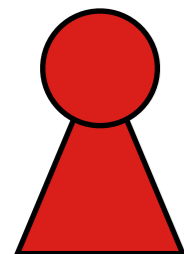Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
• bind(View view)

notify

modify
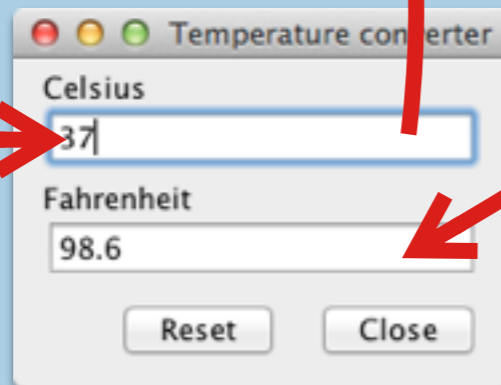
View

🔴 🟡 🟢 Temperature converter

Celsius
37

Fahrenheit
98.6

Reset   Close

input

User

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
• getFahrenheitValue()

6

Example

Example

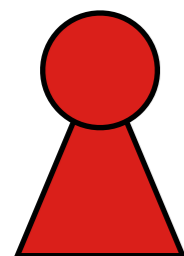Temperature Converter

Controller

TemperatureController

- TemperatureModel model
- View[] views

• setCelsiusValue(int value, Object caller)
• setFahrenheitValue(int value, Object caller)
• bind(View view)

notify

request update

modify

View

Temperature converter

Celsius
37

Fahrenheit
98.6

Reset   Close

input

User

update

Model

TemperatureModel

- int celsius
- int fahrenheit

• setCelsiusValue(int value)
• setFahrenheitValue(int value)
• getCelsiusValue()
getFahrenheitValue()

MVC
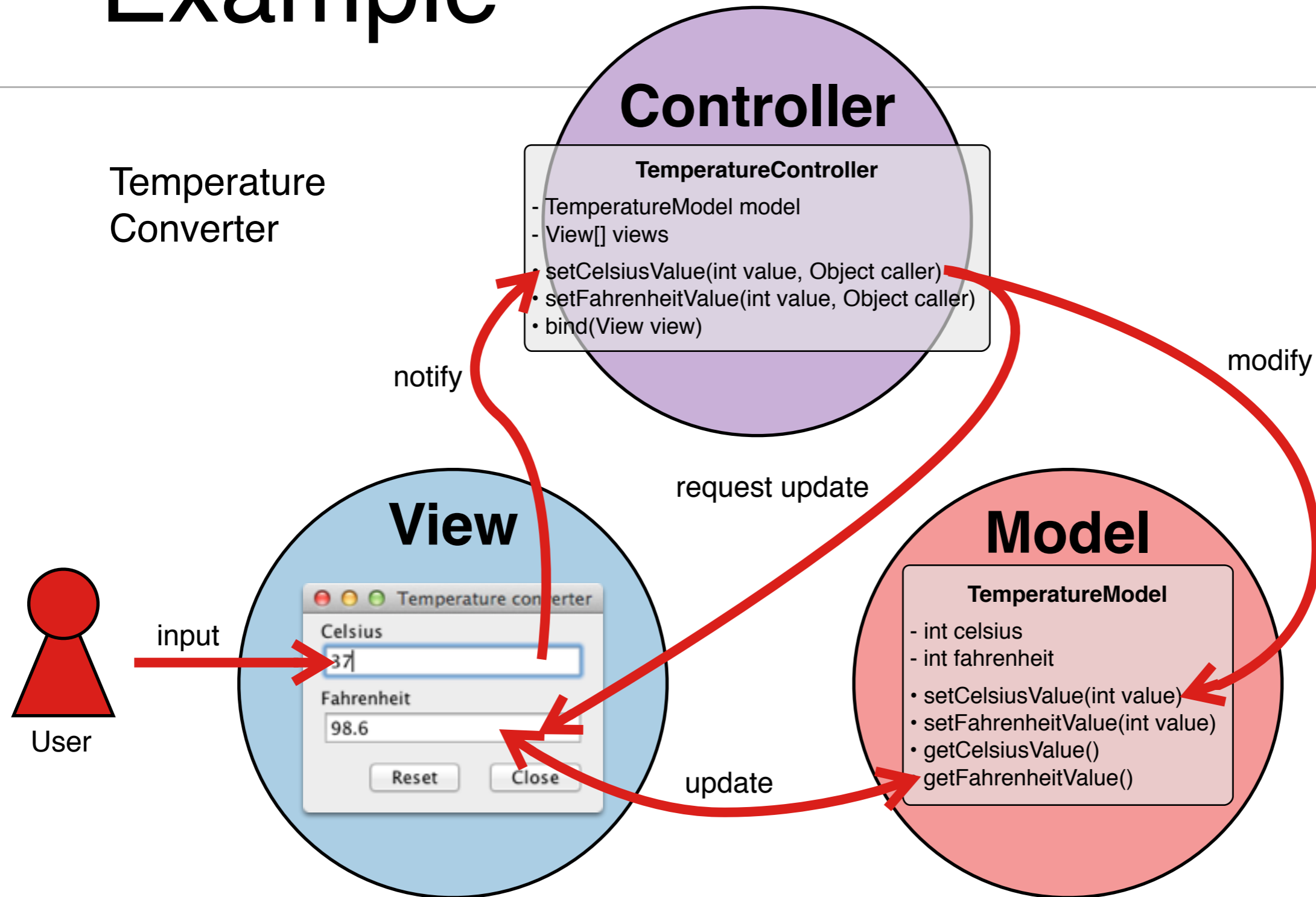
References
between
components

MVC
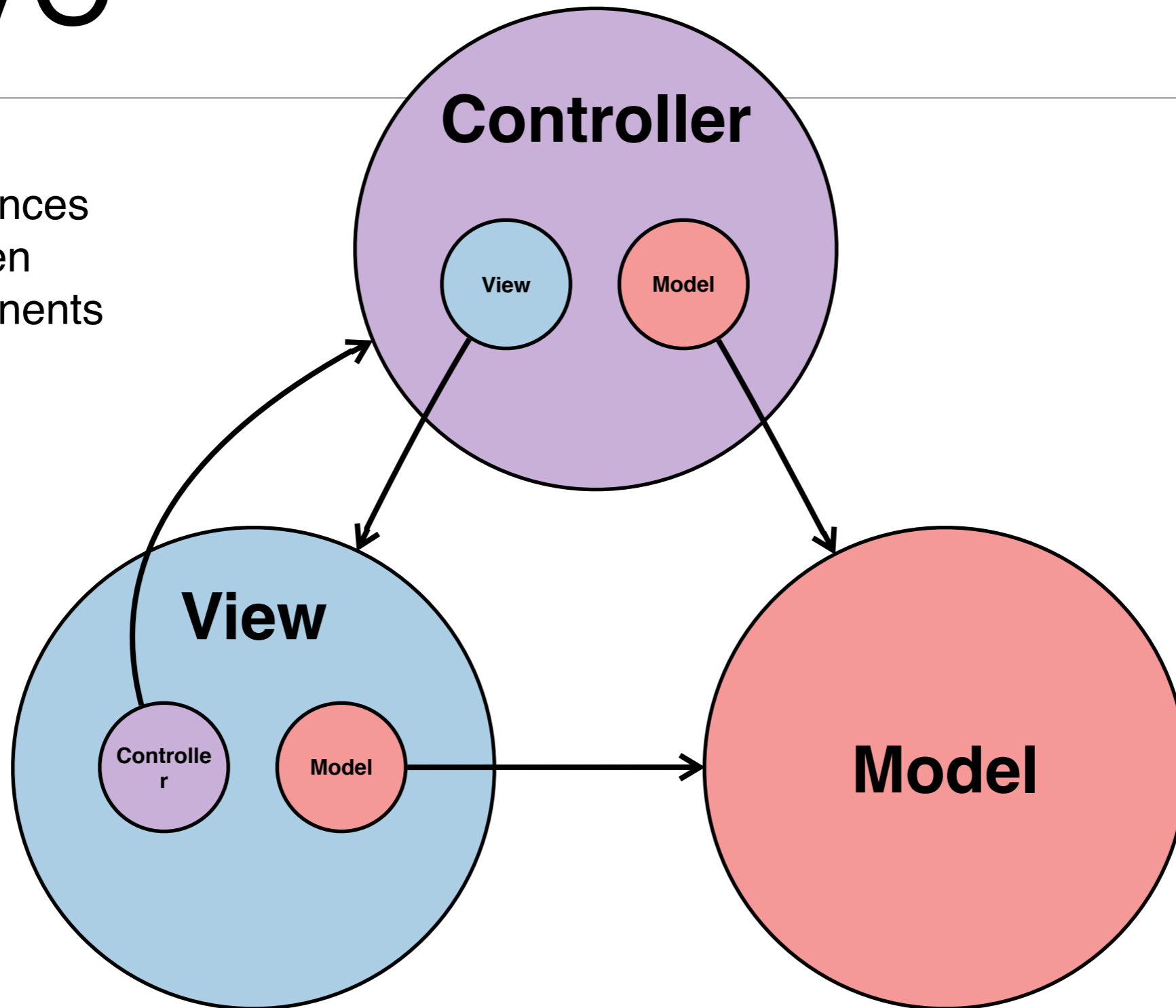
References
between
components
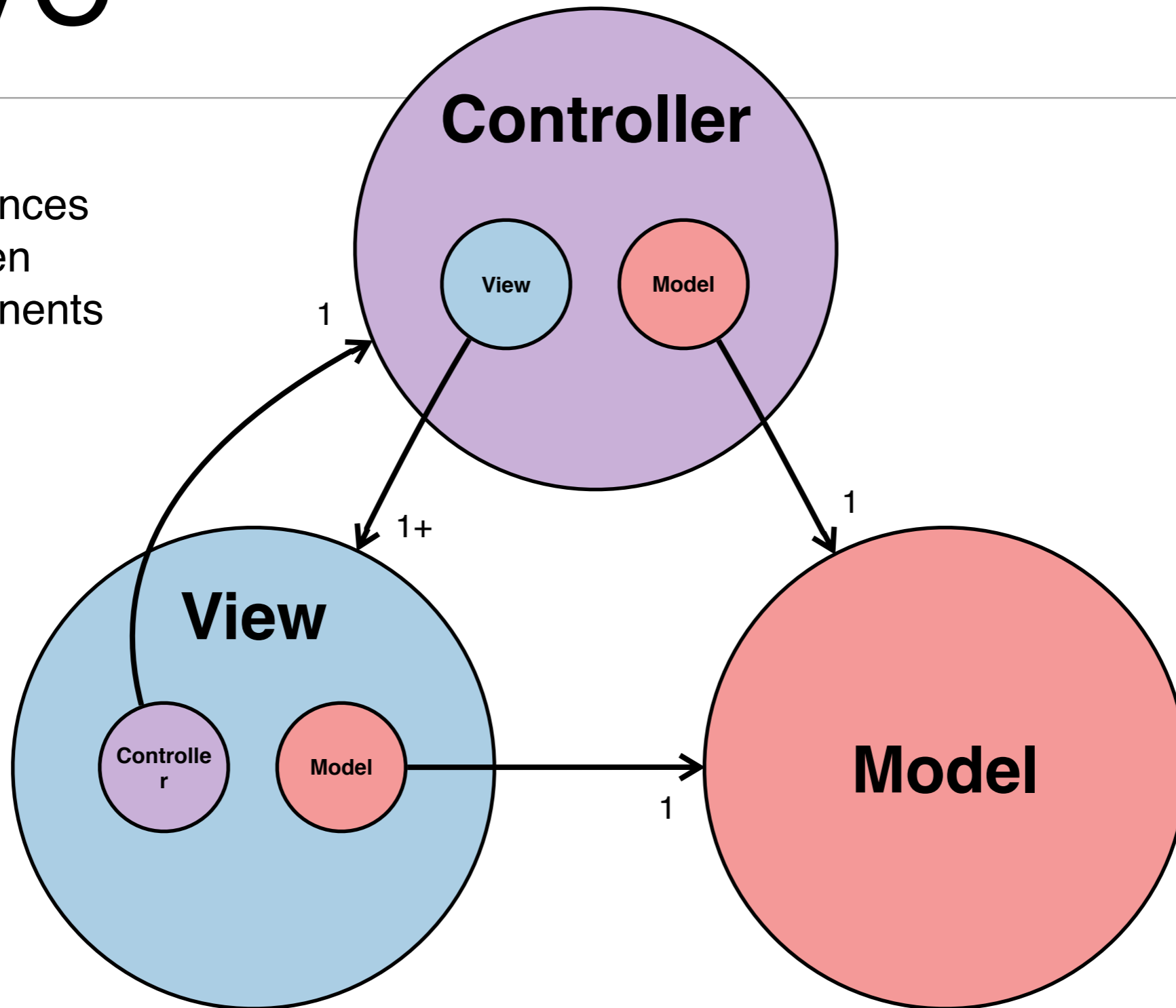
Example

Color
Chooser

Controllers

Views

Models

Example
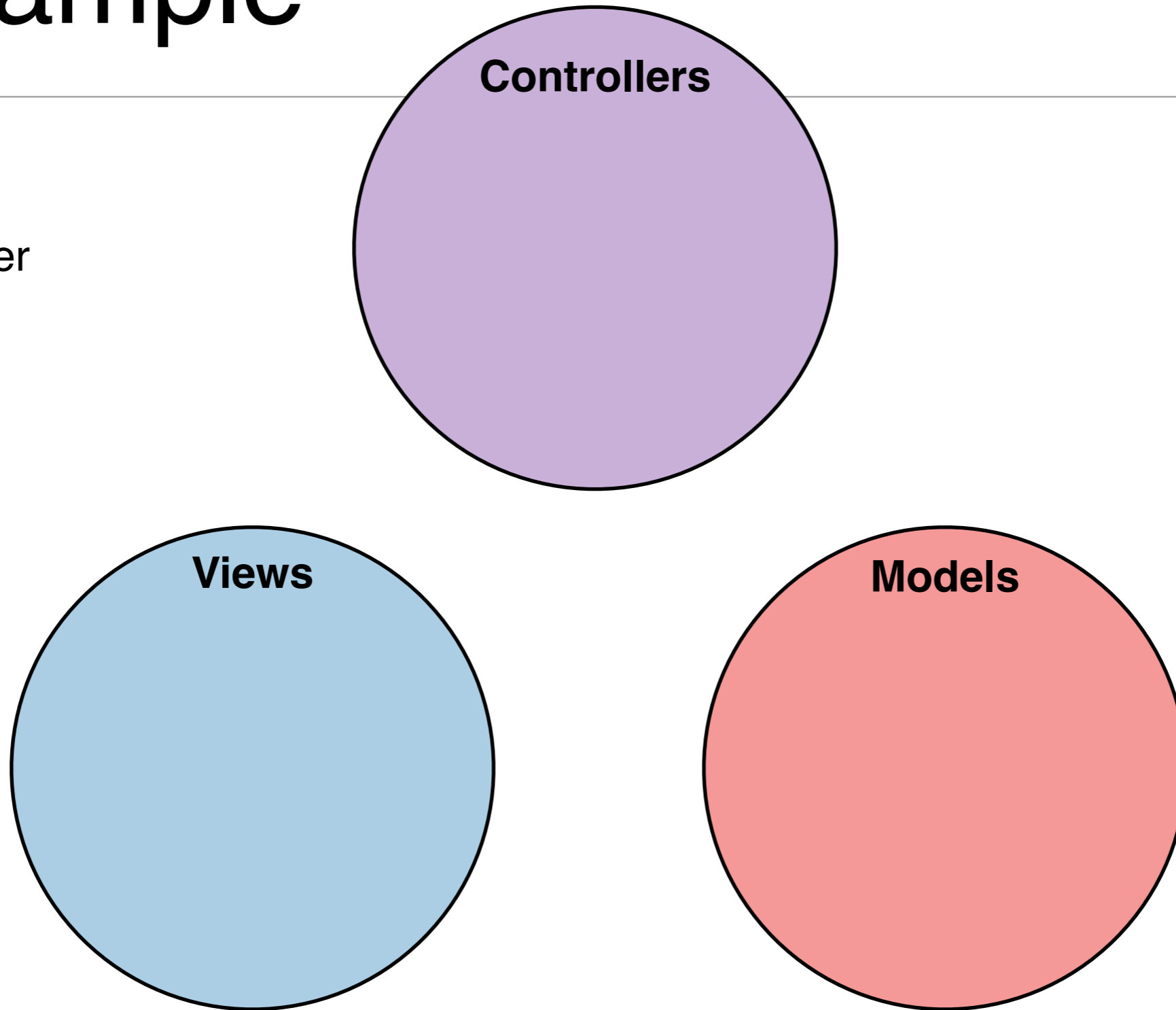
Controllers

Color
Chooser
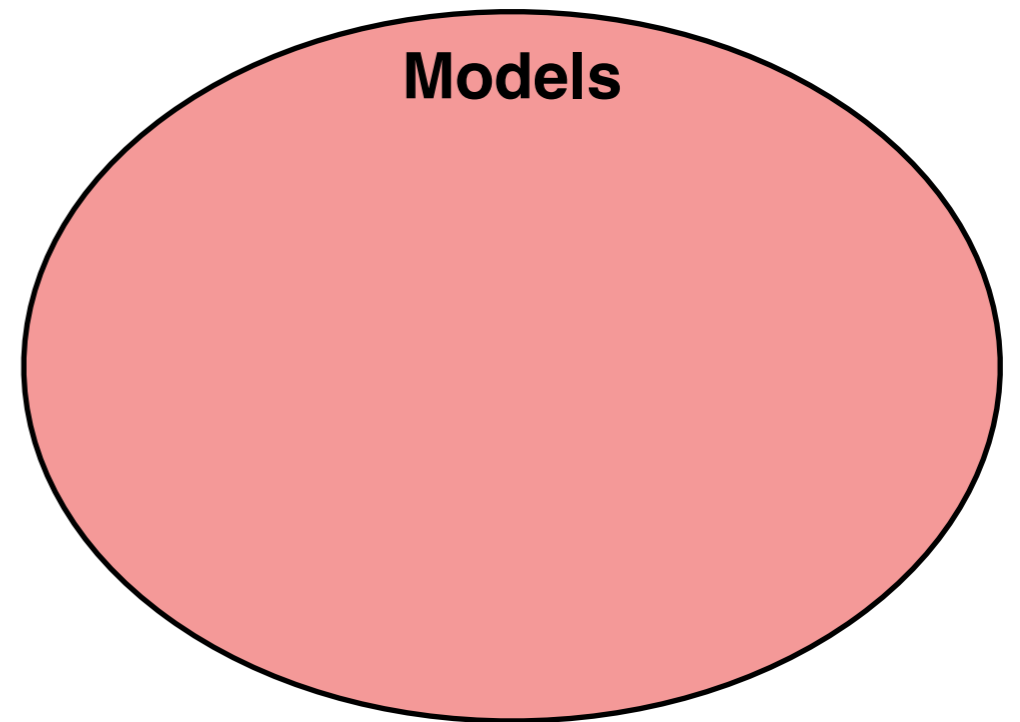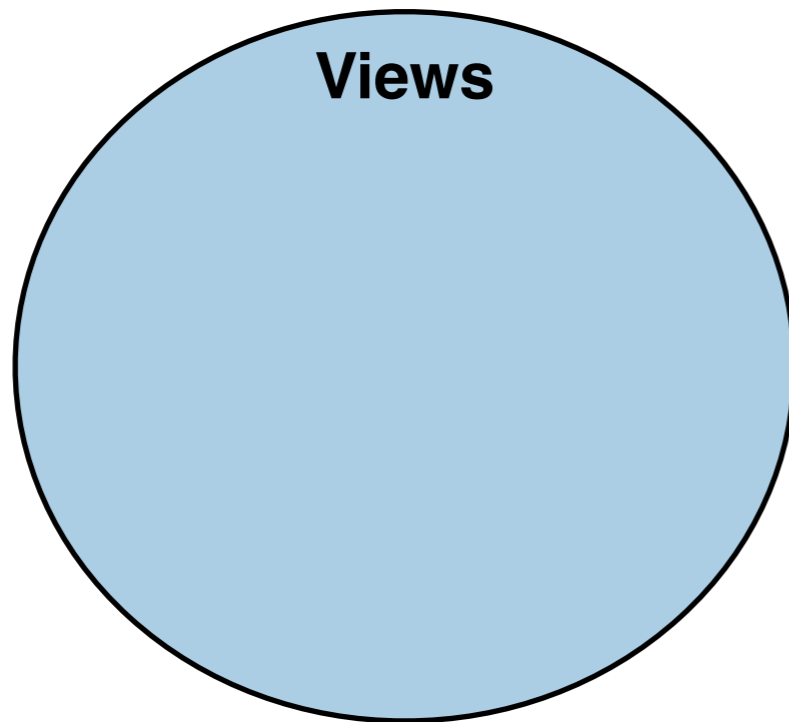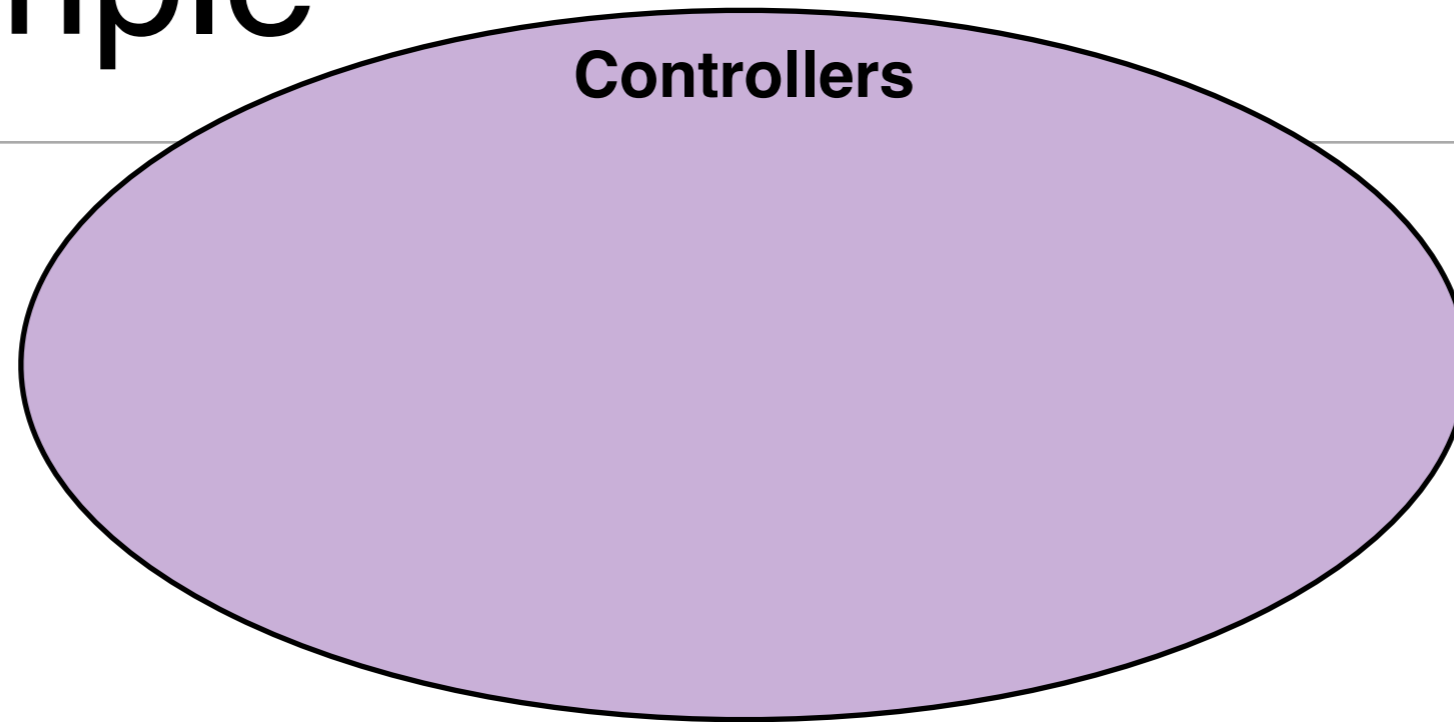
Views

Models

Example

Color
Chooser

Controllers

Views

Models

ColorModel

- CM red
- CM green
- CM blue

- CM getRed()
- CM getGreen()
- CM getBlue()
- String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

- setValue(int value)
- int getValue()
- String toHex([int minLength])

9

Example

Controllers

Color
Chooser

Views

Color Chooser

4fb2ff

79
178
255

Models

ColorModel

- CM red
- CM green
- CM blue

• CM getRed()
• CM getGreen()
• CM getBlue()
• String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

• setValue(int value)
• int getValue()
• String toHex([int minLength])

9

Example

Color Chooser

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

• setRed(int value, Object caller)
• setGreen(int value, Object caller)
• setBlue(int value, Object caller)
• bind(View view)

ComponentController

- CM model
- View[] views

• setValue(int Value, Object caller)
• addView(View view)
• removeView(View view)
• bind(View view)

Views

```
● ○ ○        Color Chooser
                          4fb2ff
         ──○──────   79
         ─────○───   178
         ─────────○  255
```

Models

ColorModel

- CM red
- CM green
- CM blue

• CM getRed()
• CM getGreen()
• CM getBlue()
• String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

• setValue(int value)
• int getValue()
• String toHex([int minLength])

Example

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

• setRed(int value, Object caller)
• setGreen(int value, Object caller)
• setBlue(int value, Object caller)
• bind(View view)

ComponentController

- CM model
- View[] views

• setValue(int Value, Object caller)
• addView(View view)
• removeView(View view)
• bind(View view)

Color Chooser

Views

Color Chooser

4fb2ff

79
178
255

User

Models

ColorModel

- CM red
- CM green
- CM blue

• CM getRed()
• CM getGreen()
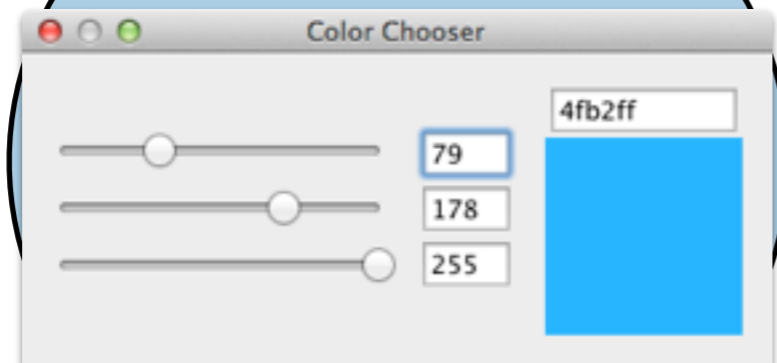• CM getBlue()
• String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

• setValue(int value)
• int getValue()
• String toHex([int minLength])
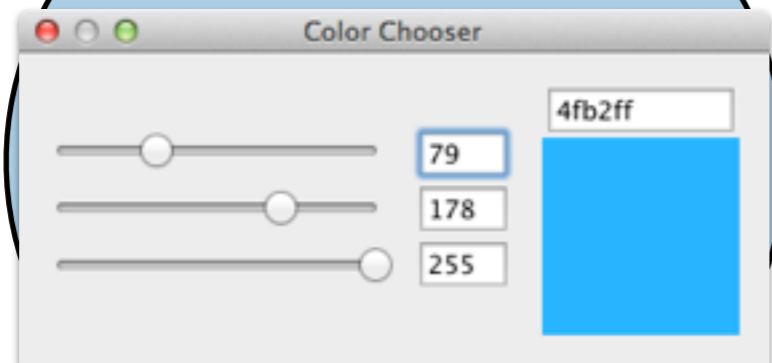
9

Example

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

- setRed(int value, Object caller)
- setGreen(int value, Object caller)
- setBlue(int value, Object caller)
- bind(View view)

ComponentController

- CM model
- View[] views

- setValue(int Value, Object caller)
- addView(View view)
- removeView(View view)
- bind(View view)

Color
Chooser

Views

Color Chooser

4fb2ff

79

178

255

input

User

Models

ColorModel

- CM red
- CM green
- CM blue

- CM getRed()
- CM getGreen()
- CM getBlue()
- String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

- setValue(int value)
- int getValue()
- String toHex([int minLength])

9

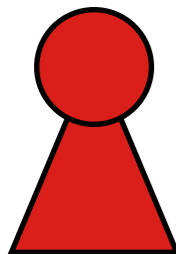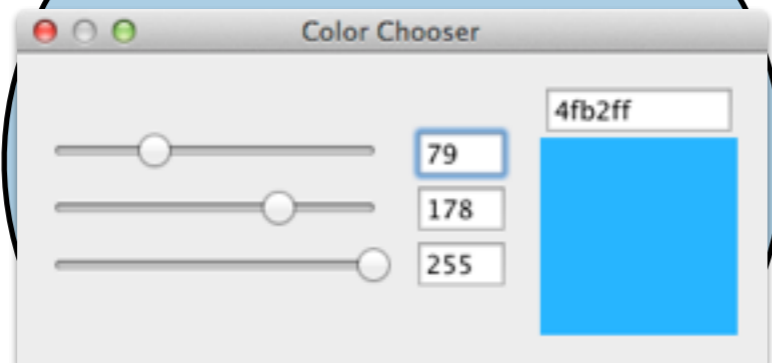# Example

Example

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

• setRed(int value, Object caller)
• setGreen(int value, Object caller)
• setBlue(int value, Object caller)
• bind(View view)

ComponentController

- CM model
- View[] views

• setValue(int Value, Object caller)
• addView(View view)
• removeView(View view)
• bind(View view)

Color Chooser

notify

modify

Views

Color Chooser

input

4fb2ff

79

178

255

User

Models

ColorModel

- CM red
- CM green
- CM blue

• CM getRed()
• CM getGreen()
• CM getBlue()
• String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

• setValue(int value)
• int getValue()
• String toHex([int minLength])
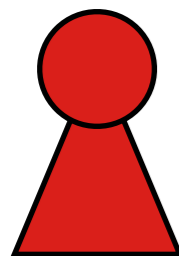
Example

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

• setRed(int value, Object caller)
• setGreen(int value, Object caller)
• setBlue(int value, Object caller)
• bind(View view)

ComponentController

- CM model
- View[] views

• setValue(int Value, Object caller)
• addView(View view)
• removeView(View view)
• bind(View view)

Color
Chooser

Views

Color Chooser

79
178
255

4fb2ff

input

User

notify

request updates

modify

Models

ColorModel

- CM red
- CM green
- CM blue

• CM getRed()
• CM getGreen()
• CM getBlue()
• String toHex()

ComponentModel (CM)

- int value
- ColorModel parent

• setValue(int value)
• int getValue()
• String toHex([int minLength])

9

Example

Controllers

ColorController

- ColorModel model
- CM red
- CM green
- CM blue

- setRed(int value, Object caller)
- setGreen(int value, Object caller)
- setBlue(int value, Object caller)
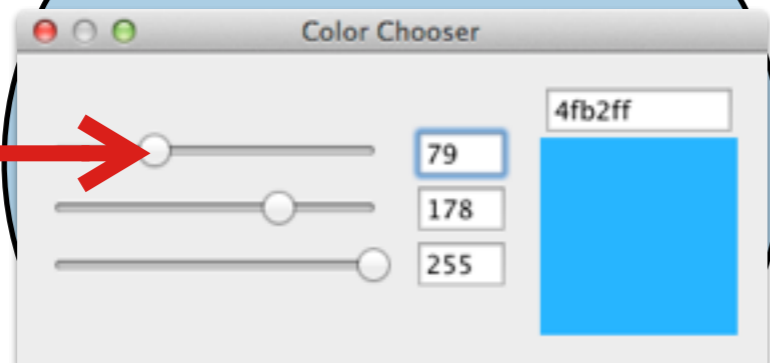- bind(View view)

ComponentController

- CM model
- View[] views

- setValue(int Value, Object caller)
- addView(View view)
- removeView(View view)
- bind(View view)

Color Chooser

notify

request updates

modify

Views

Color Chooser

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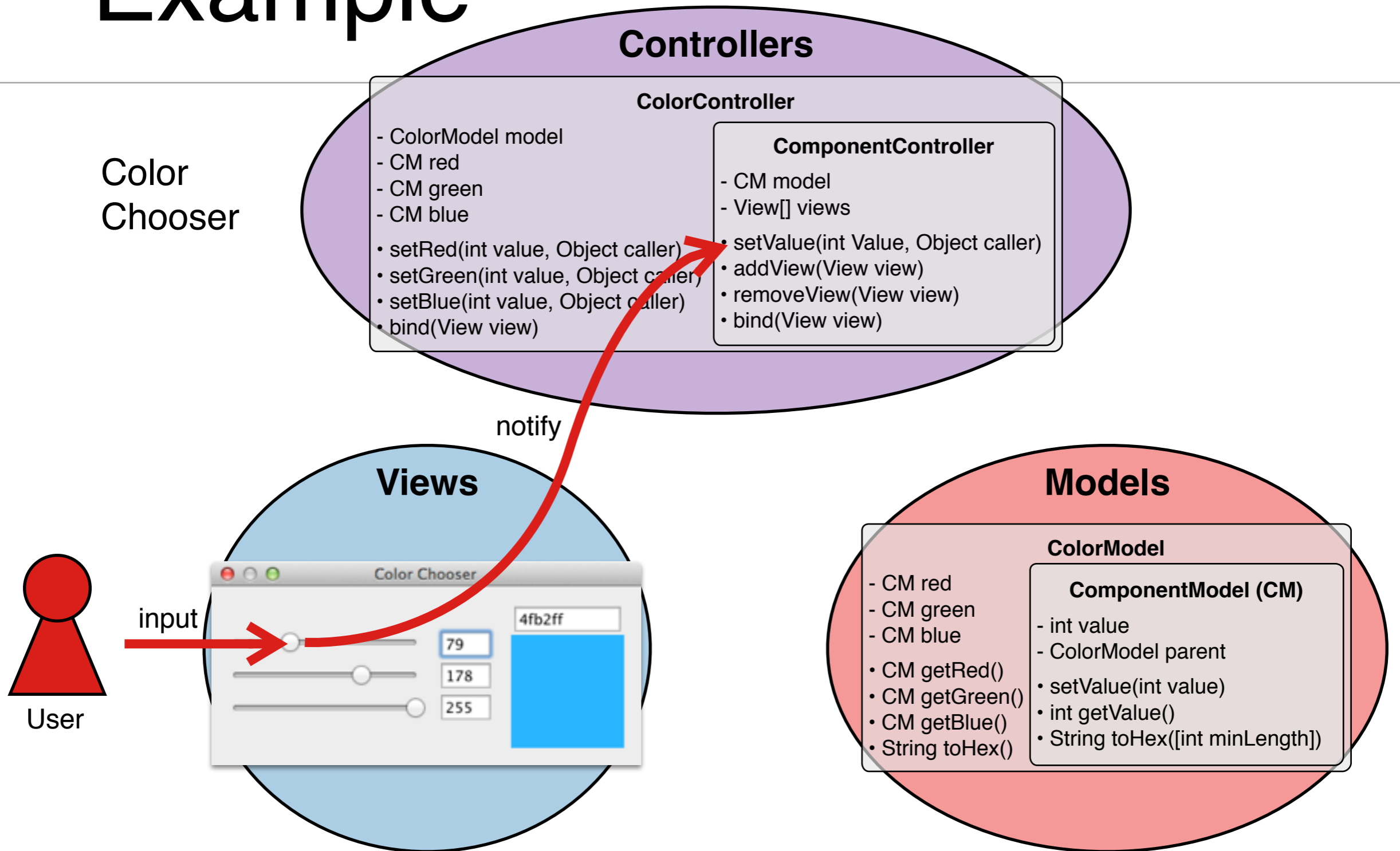255

input

User

updates

Models

ColorModel

- CM red
- CM green
- CM blue

- CM getRed()
- CM getGreen()
- CM getBlue()
- String toHex()

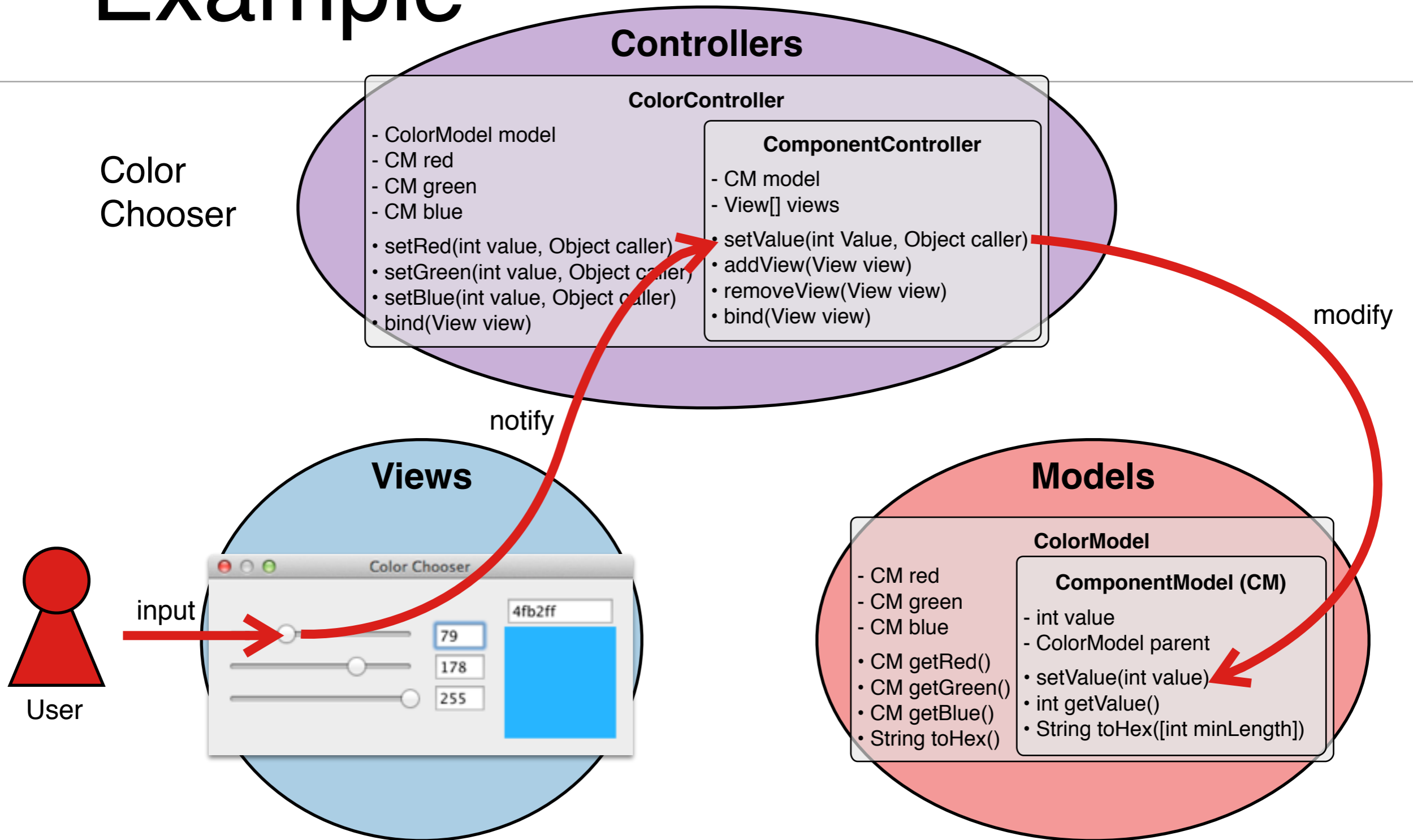**ComponentModel (CM)**

- int value
- ColorModel parent

- setValue(int value)
- int getValue()
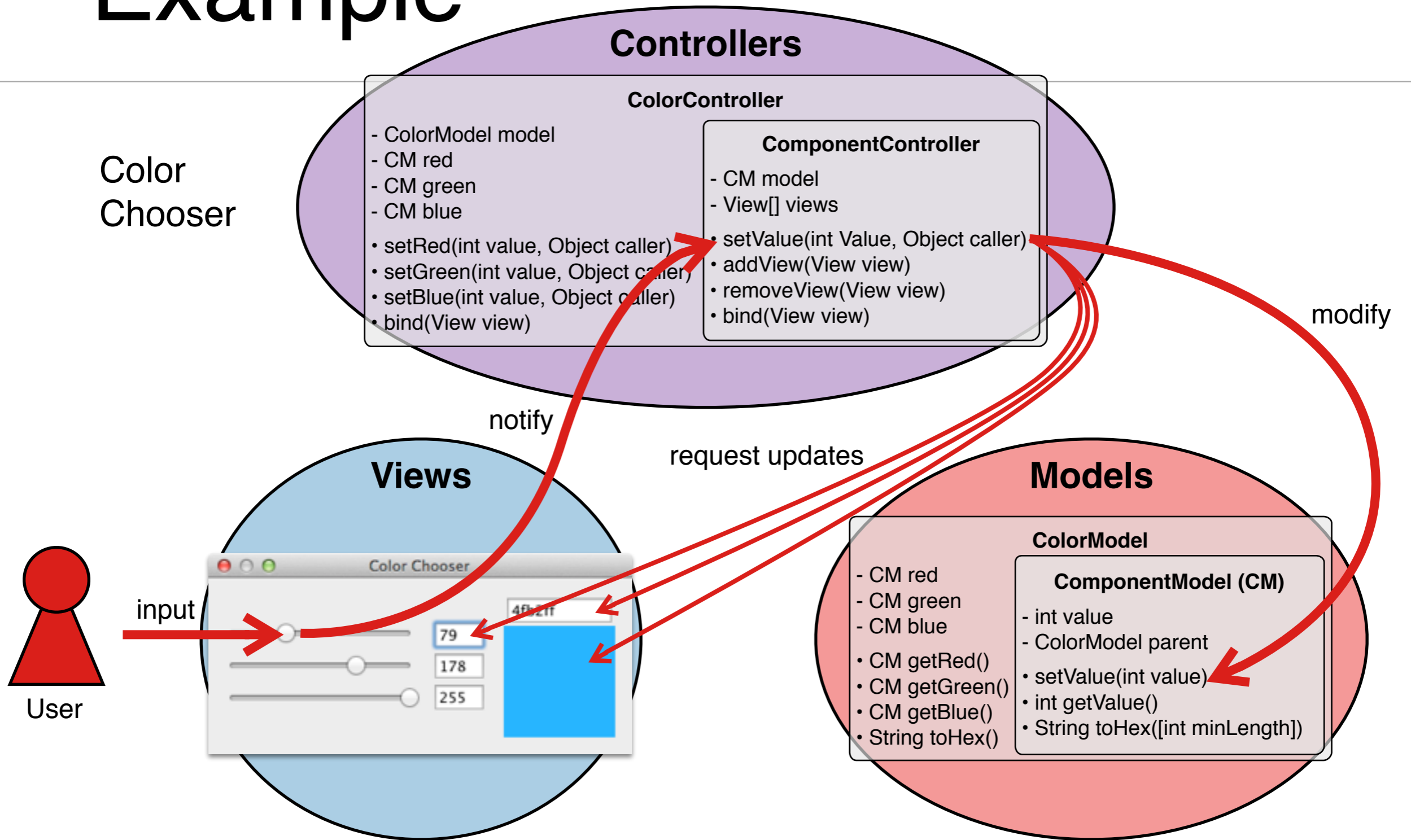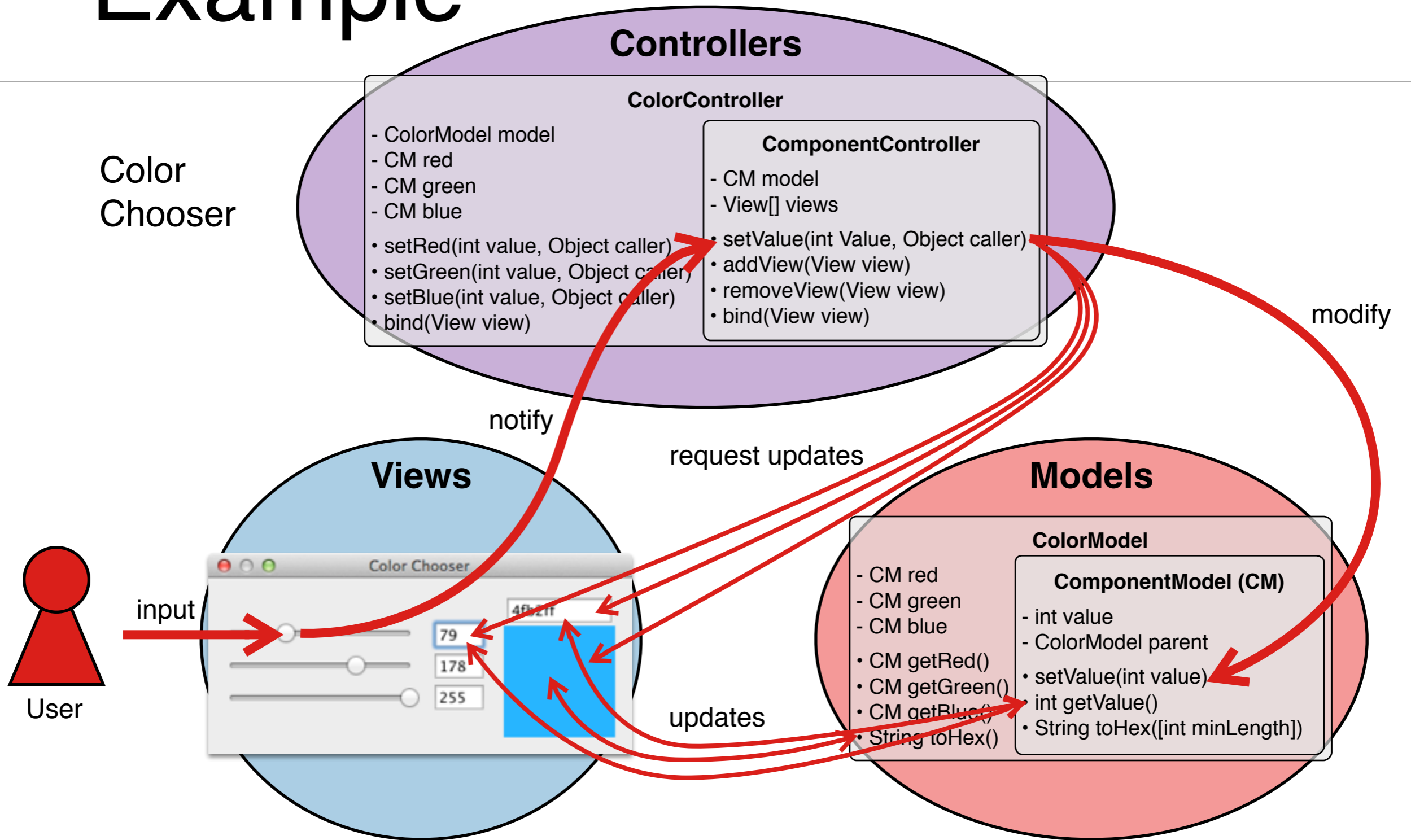- String toHex([int minLength])

9

Models

Different types

Values

String, numbers

Sequences

Lists (AbstractListModel)

Views

Provide a **representation** of a model

The representation is often **discrete**

Examples from Java **Swing**:

String

JTextField, JLabel

Numbers

JSlider, JTextField, JLabel

Sequences

JLists, JComboBox

Methods

JButton, JMenuItem

Example

Color chooser:

Model

Color containing:

Red, Green, Blue (int number).

Views

JSliders and JTextFields for Red, Green, Blue.

JTextField and JPanel for Color

Controller

Sets listeners on the text field to update the temperature model.