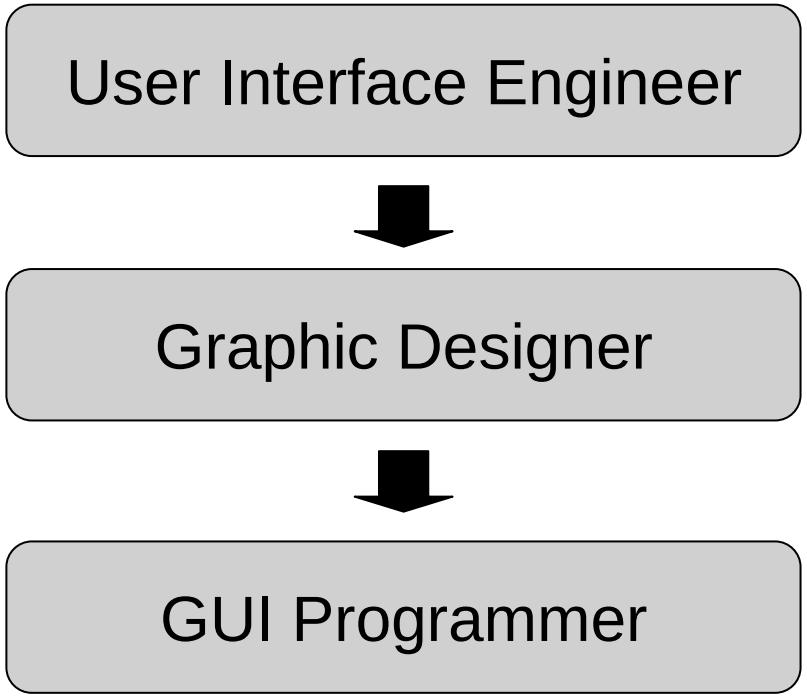
Software 1

Recitation No. 10:
SWT GUI Package

The GUI Development Process

- **GUI**: **G**raphical **U**ser **I**nterface



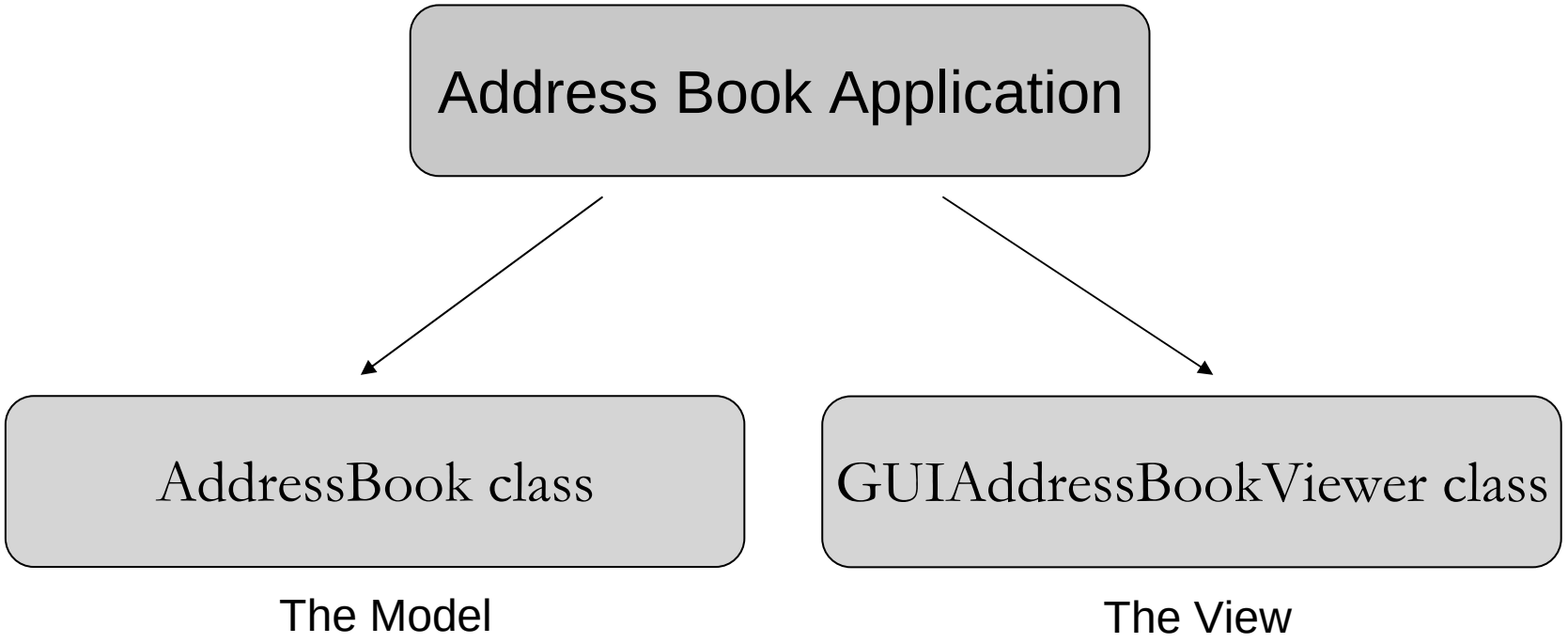
GUI Application

- When implementing a GUI application one should specify:
  - the GUI elements
  - the 2D arrangement of the GUI elements
  - the behavior of the GUI elements
- Java GUI libraries:
  - AWT (**A**bstract **W**indowing **T**oolkit)
  - Swing
  - SWT (**S**tandard **W**idget **T**oolkit)

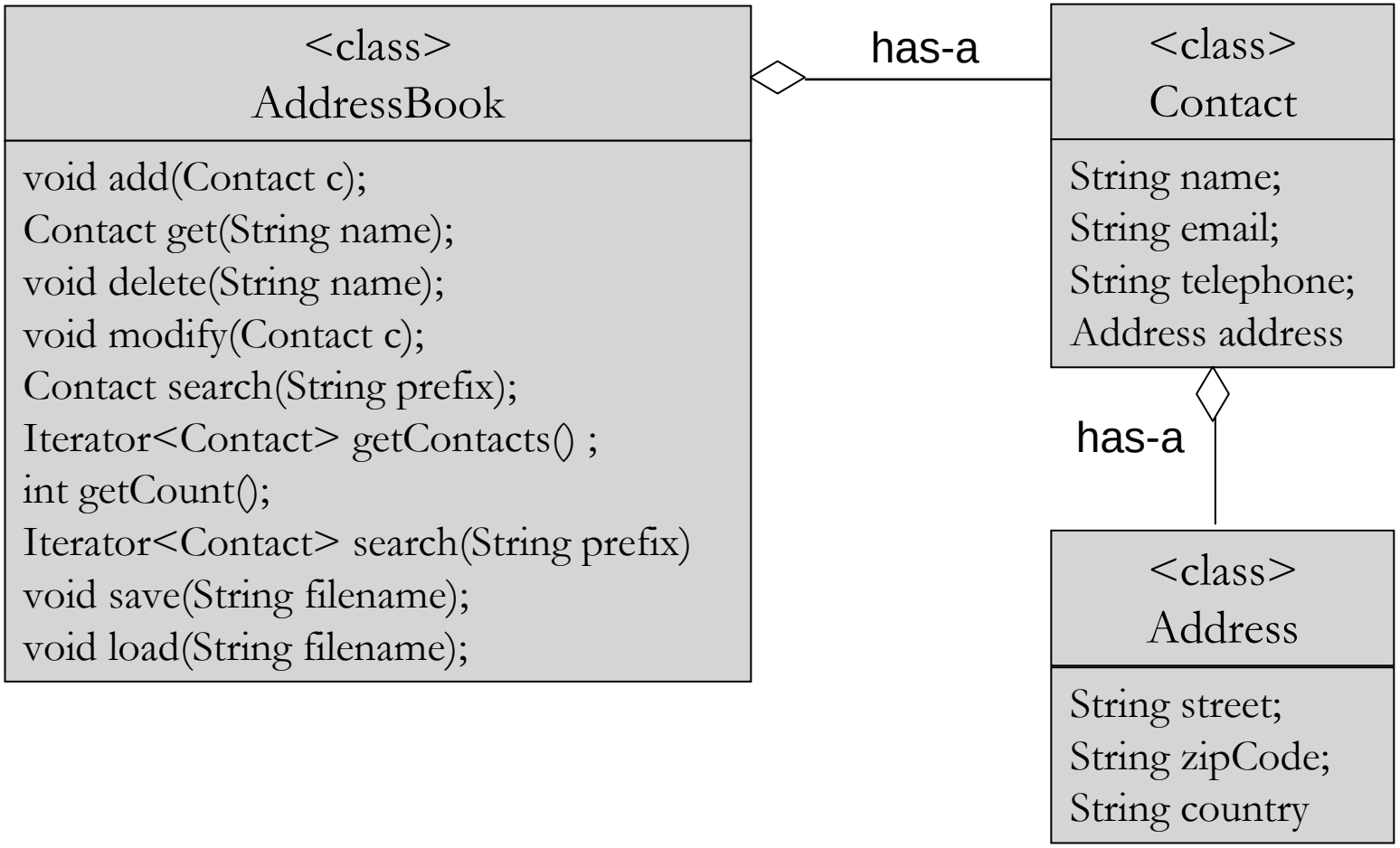
Model-View Separation

- Separate between the application logic (***model***) part and the GUI (***view***) part.
- Ensures that view changes have no effect on the basic model
- Enables us to maintain one model for several different views

Example: Address Book



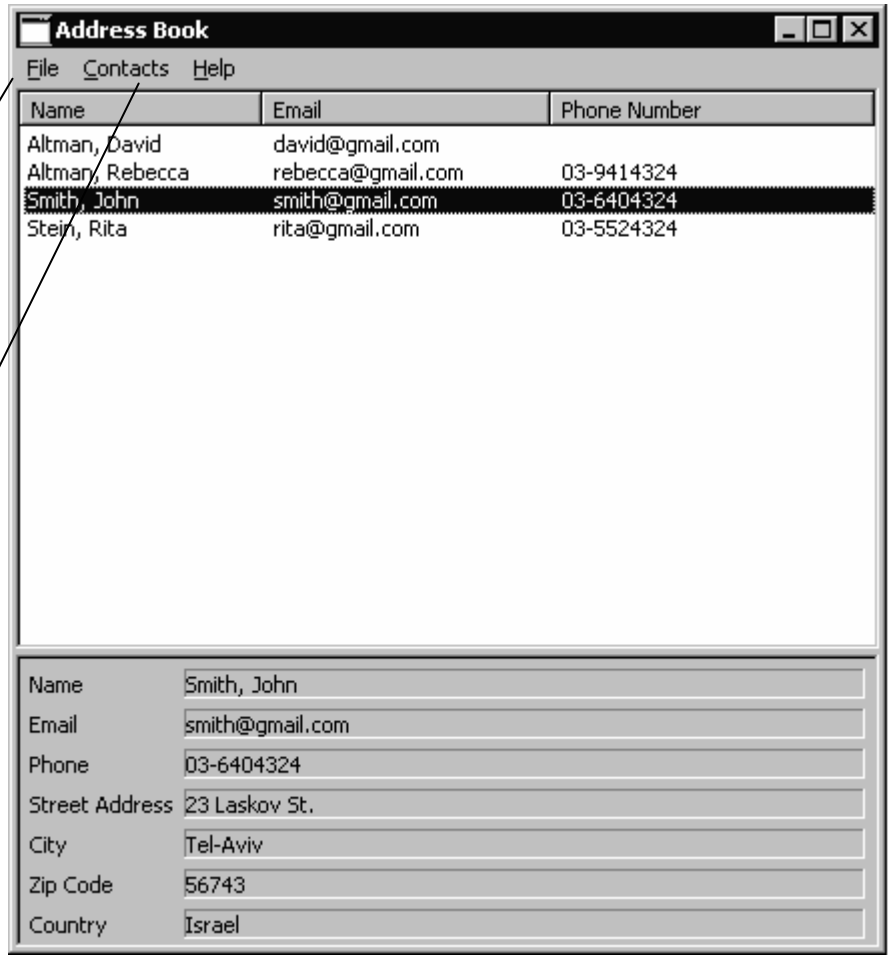
The Model


<class>
AddressBook
void add(Contact c);
Contact get(String name);
void delete(String name);
void modify(Contact c);
Contact search(String prefix);
Iterator<Contact> getContacts() ;
int getCount();
Iterator<Contact> search(String prefix)
void save(String filename);
void load(String filename);
has-a
<class>
Contact
String name;
String email;
String telephone;
Address address
has-a
<class>
Address
String street;
String zipCode;
String country

The View

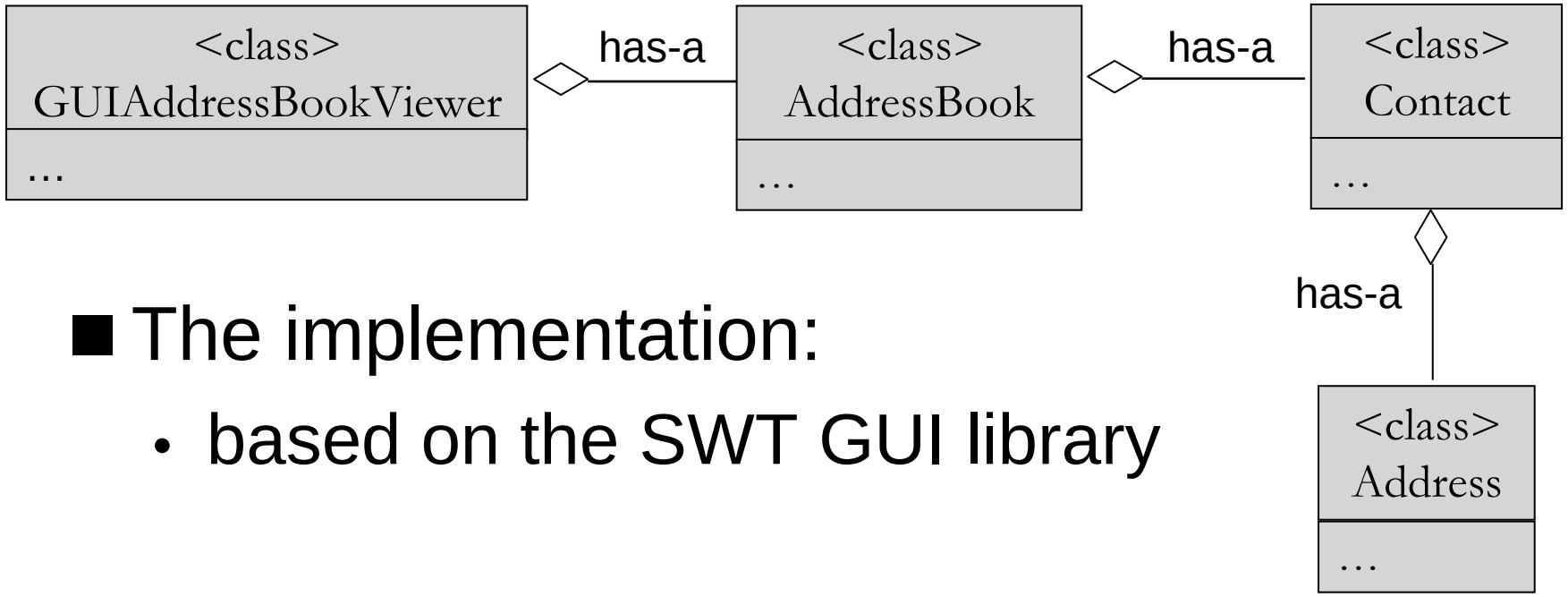
New Address Book Ctrl+N
Open Ctrl+O
Save Ctrl+S

New Contact Ctrl+M
Edit
Delete



The View

- The class diagram:

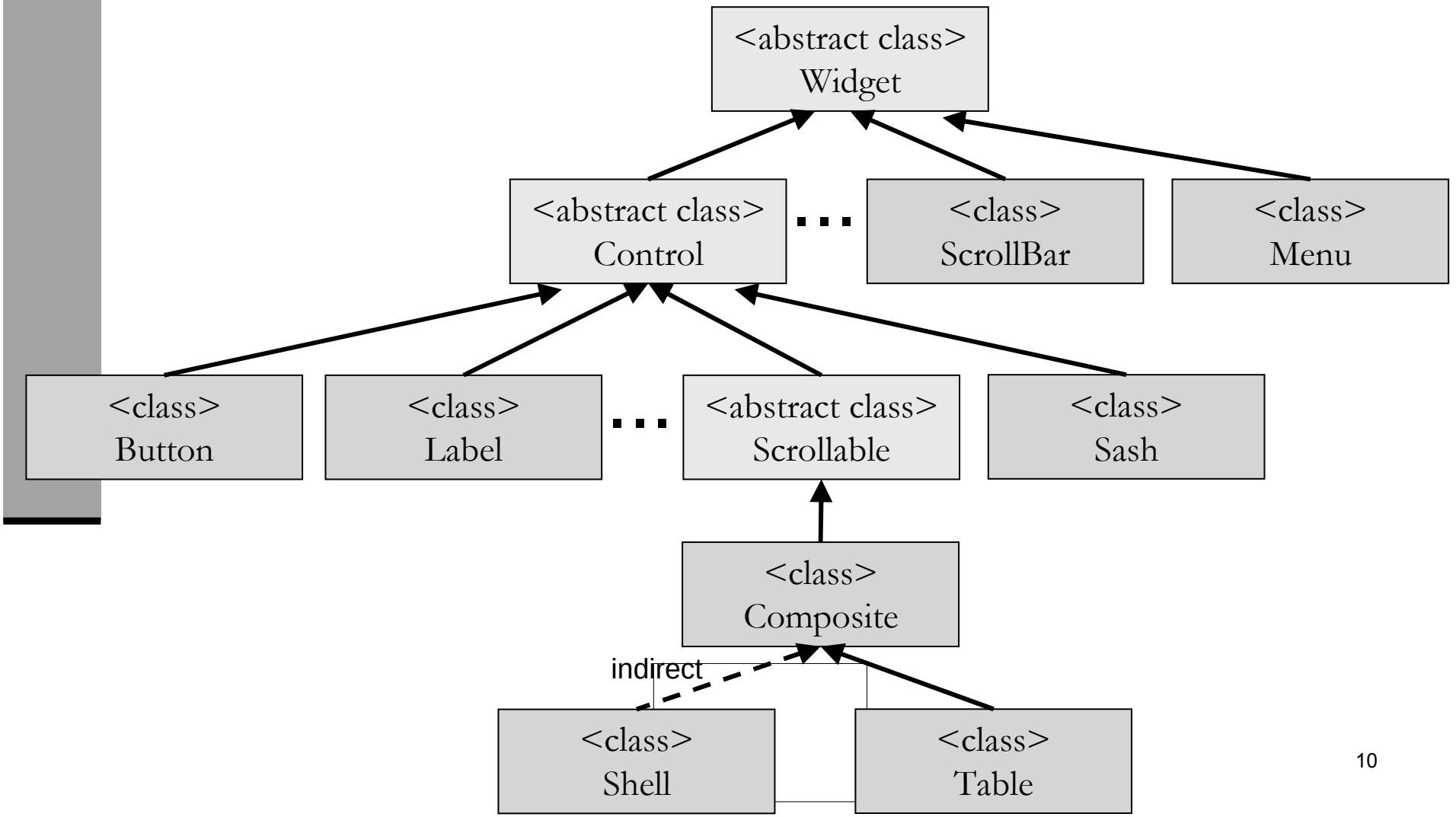


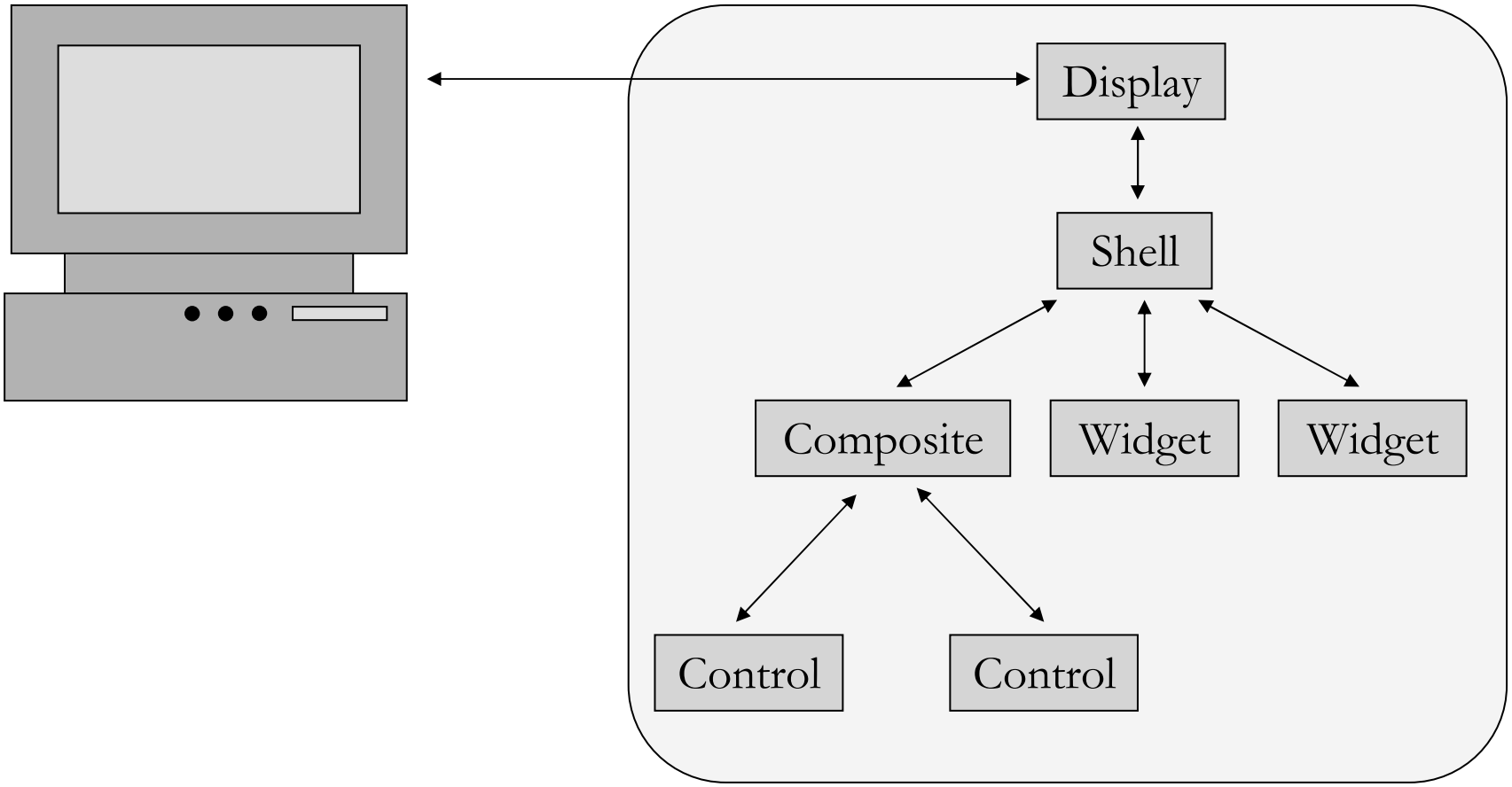
- The implementation:
  - based on the SWT GUI library

SWT

- Online Documentation:
  - SWT HomePage:
    http://www.eclipse.org/swt/
    - JavaDoc
    - Snippets
  - Getting Started with Eclipse and the SWT:
    http://www.cs.umanitoba.ca/~eclipse/

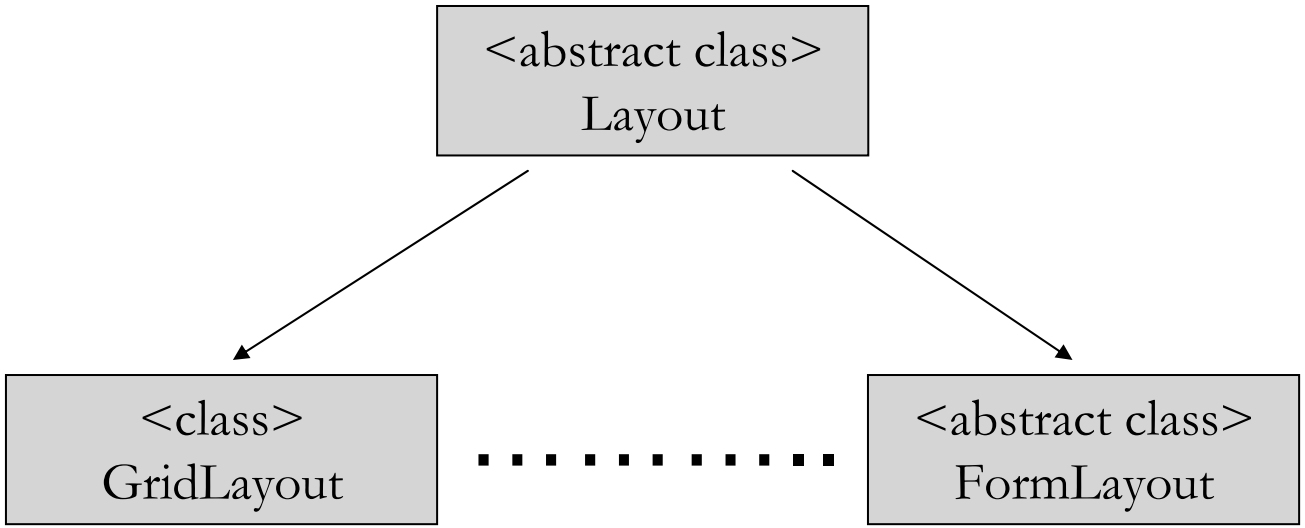
Widgets


<abstract class>
Widget
<abstract class>
Control
...
<class>
ScrollBar
<class>
Menu
<class>
Button
<class>
Label
...
<abstract class>
Scrollable
<class>
Sash
<class>
Composite
indirect
<class>
Shell
<class>
Table


Display
Shell
Composite
Widget
Widget
Control
Control

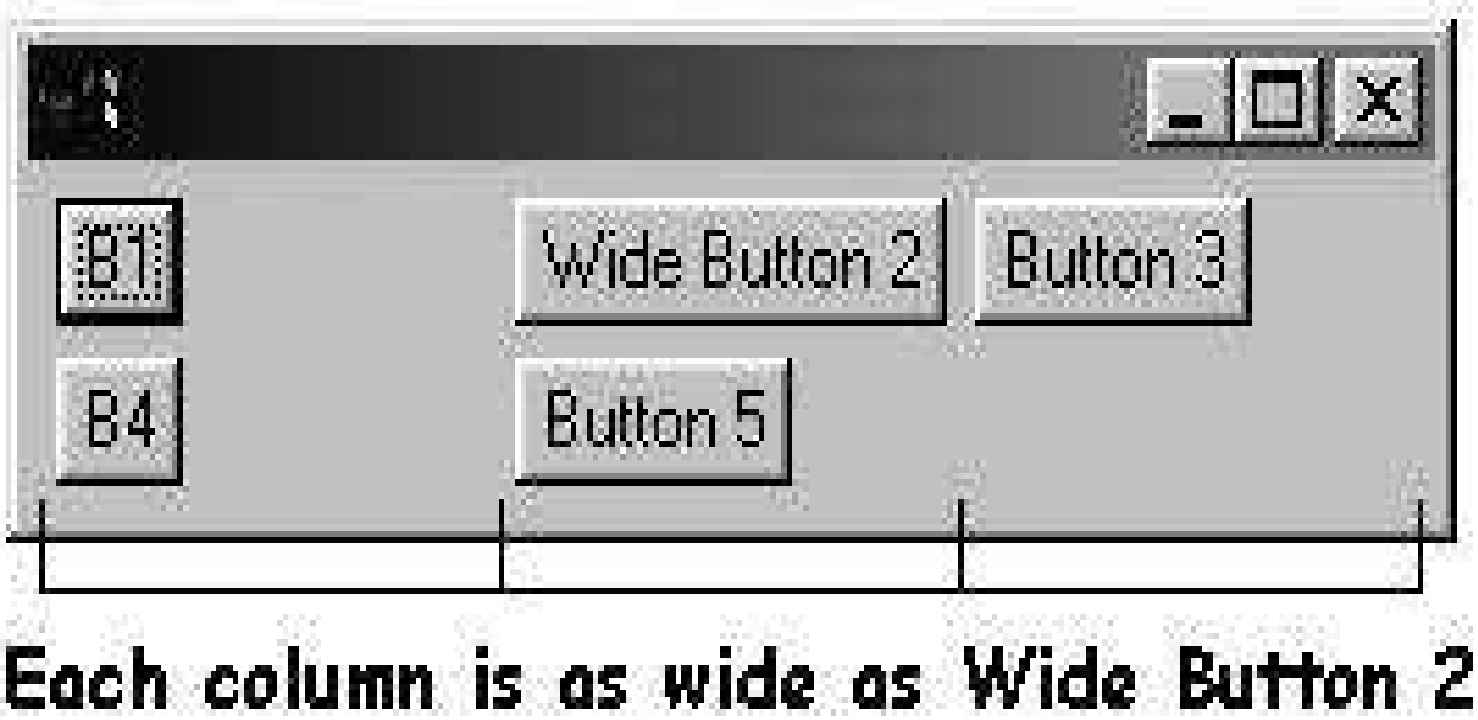
Layouts

- A Layout controls the position and size of Control widgets in a Composite.



GridLayout

- Lays out the Control widgets in a grid.



GridLayout

- Lays out the Control widgets in a grid.
- GridLayout Configuration fields:

Field	Default	Description
horizontalSpacing verticalSpacing	5	Horizontal/vertical space between the grid cells
marginHeight marginWidth	5	The size of the horizontal/vertical margins of the layout
numColumns	1	Number of columns
makeColumnsEqualWidth	false	If true, all columns will have the same size

GridLayout (cont.)

GridData:

- Use GridData objects to configure the Control widgets in a GridLayout.
- Use the setLayoutData() to set a GridData object into a Control, e.g.

```
label.setLayoutData(new GridData(…));
```

- Do not reuse GridData objects

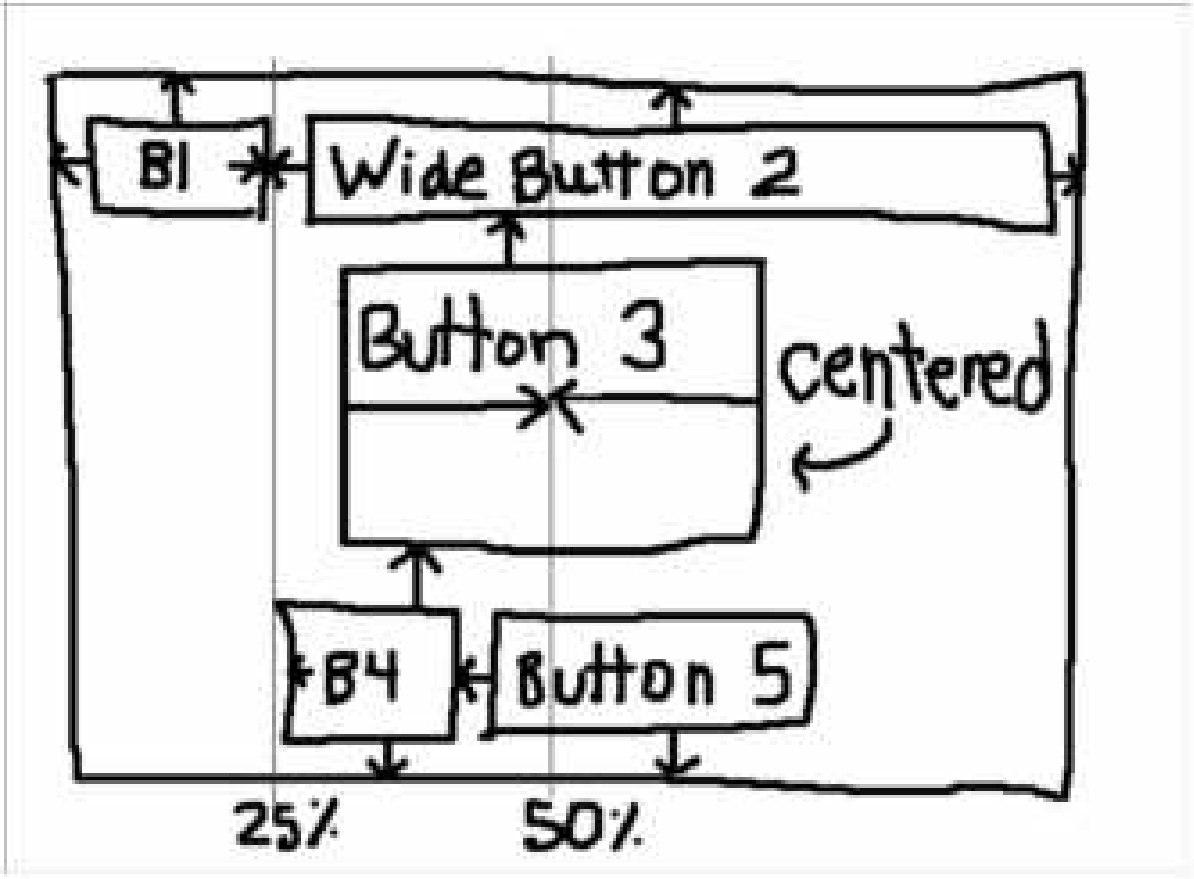
GridLayout (cont.)

- GridData Configuration Fields:

Field	Default	Description
grabExcessHorizontalSpace grabExcessVerticalSpace	false	If true, the width/length of the widget will be as large as possible to fit the remaining space.
heightHint widthHint	SWT.DEFAULT (no minimum)	A minimum width/height for the widget.
horizontalSpan verticalSpan	1	the number of column/row cells that the widget will take up.
horizontalIndent	0	the number of indentation pixels along the left side of the cell.
horizontalAlignment verticalAlignment	GridData.BEGINNING GridData.CENTER	how controls will be positioned horizontally/vertically within a cell.

FormLayout

- A very flexible layout



FormLayouts

- A very flexible layout
- FormLayout Configuration Properties:

Field	Default	Description
marginHeight marginWidth	0	the margin width/height
spacing	0	the number of pixels between the edge of one control and the edge of its neighbouring control.

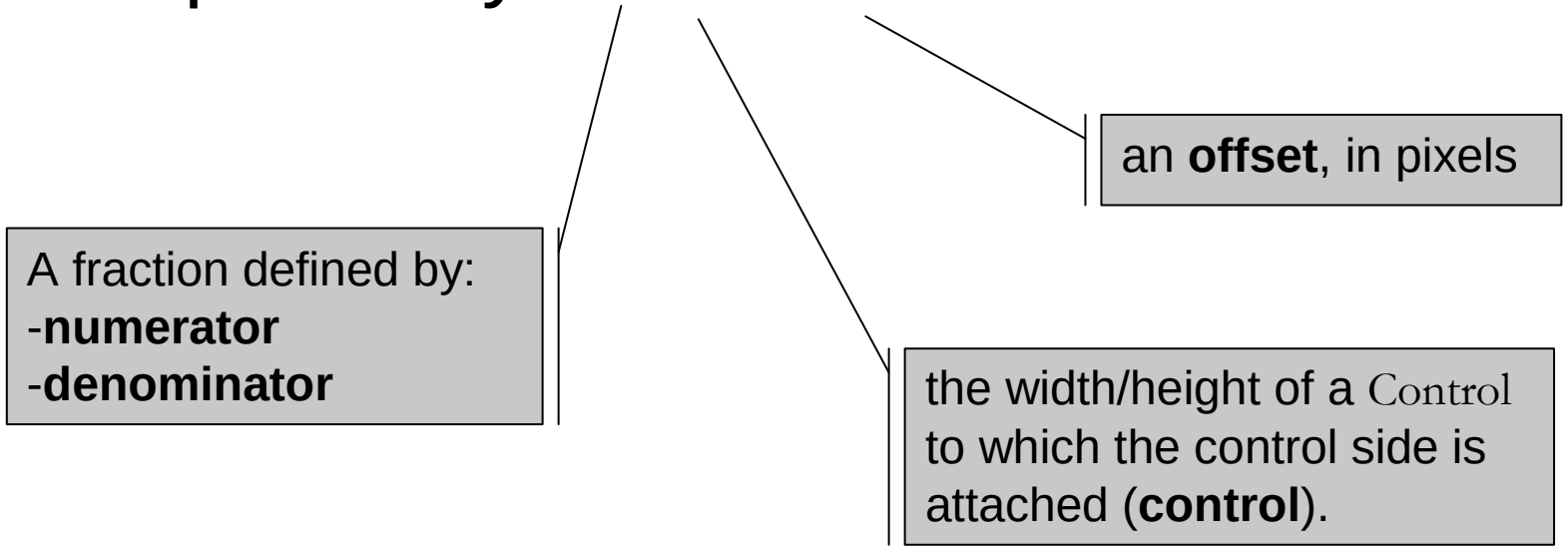
FormLayouts (cont.)

- Use FormData objects to configure the Control widgets in a FormLayout.
- Use the setLayoutData() to set a FormData object into a Control widget.
- A FormData object has a FormAttachment object for each edge of the Control.

Field	Description
width/height	the desired width/height in pixels.
top/bottom/left/right	Specifies the position of the control attachment.

FormLayouts (cont.)

- A FormAttachment defines where to attach the side of a Control by using the equation: y = ax + b.



FormLayouts (cont.)

- Main FormAttachment Constructors:
  - public FormAttachment(Control control)
  - public FormAttachment(Control control, int offset)
  - public FormAttachment(int numerator)
  - public FormAttachment(int numerator, int offset)

Field	Default
control	Parent Composite
numerator	100
denominator	100
offset	0

$$y = \frac{numerator}{denominnator} \bullet x + offet$$

x – control's width/height